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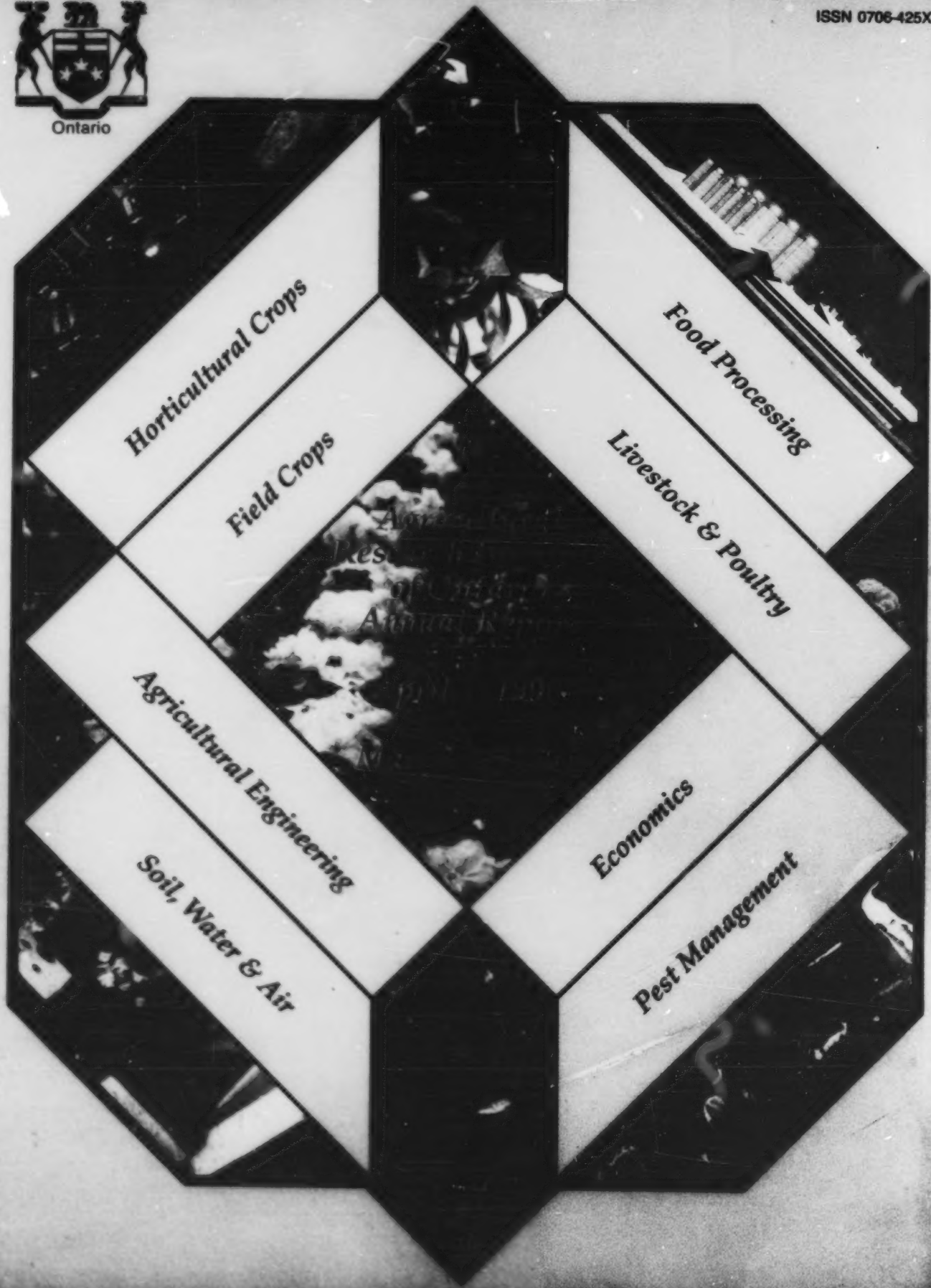

92-01701/

REPORT OF THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

Dorchester, Ontario
April 1, 1991

The Honourable Elmer Buchanan
Minister of Agriculture and Food
Legislative Buildings
Toronto, Ontario
M7A 1A3

Dear Sir:

I have the honour to submit the twenty-eighth research Report of the Agricultural Research Institute of Ontario for the period April 1, 1990 to March 31, 1991.

The Institute wishes to express its sincere appreciation for the wholehearted cooperation of the administration and staff of the institutions at Alfred, Centralia, Guelph, Kemptville, New Liskeard, Ridgetown, Toronto, and Vineland in the planning and execution of research programs in agriculture, veterinary medicine, and consumer studies.

Respectfully submitted

W. R. Grieve

W. Grieve
Chairman
Agricultural Research Institute of Ontario

Toronto, Ontario
March 31, 1991

Mr. William Grieve
Agricultural Research Institute of Ontario

Dear Sir:

I submit herewith a report of the Ontario Ministry of Agriculture and Food's research programs in agriculture, veterinary medicine, and consumer studies for the year ending March 31, 1991.

Respectfully submitted

J.C. Rennie
Director of Research
Agricultural Research Institute of Ontario

The Agricultural Research Institute of Ontario Act passed by the Provincial Legislature created the Institute in 1962 with specific duties and responsibilites over the expenditure of the Ontario Ministry of Agriculture and Food's research funds for agriculture, veterinary medicine, and consumer studies. The ARIO meets every two months to review research programs, to inquire into whether or not they meet the needs of the industry, and to make recommendations to the Minister, where appropriate, on the expansion or reduction of programs and their human and physical resources.

The ARIO is composed largely of farmers and agribusiness people and its memebership reflects the broadly based nature of Ontario's industry. The membership, of not more than fifteen, is appointed by the Lieutenant Governor in Council who also appoints the Director of Research from the Ministry.

Ten centres report to the ARIO: Agricultural Engineering Services, Agricultural and Food Laboratory Services, Alfred College of Agriculture and Food Technology, Centralia College of Agricultural Technology, Policy and Programs Division, Horticultural Research Institute of Ontario, Kemptville College of Agricultural Technology, New Liskeard College of Agricultural Technology, Ridgetown College of Agricultural Technology, and the University of Guelph. The seven experimental stations, Alma, Arkell, Cambridge, Elora, Guelph, Ponsonby, and Woodstock, are managed by the University under contract with the Ministry.

Under the Act, the Institute may accept donations and grants for research which are held in trust by the Director of Research and allocated for research in accordance with the terms of the funds.

The ARIO is a unique corporate body responsible to the Minister of Agriculture and Food.

MEMBERS OF THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

W. Grieve, Chairman
H. Brown, Vice-Chairman
J.C. Rennie, Director of Research
B. Morgan, Comptroller
J. Aluin
C. Belluz
L. Cohoe
E. Hart
S. Leuty
J. McDougall
Y. Martel
B. Schubert
T. Smyth
G. Strang
P. Wall
D. Whale

REPORTING INSTITUTIONS

AES
Agricultural Engineering Services
Resources Management Branch
Guelph Agriculture Centre
P.O. Box 1030
Guelph, Ontario
N1H 6N1

AFLS
Agricultural and Food Laboratory Services
Guelph Agriculture Centre
P.O. Box 1030
Guelph, Ontario
N1H 6N1

ACAFT
Alfred College of Agriculture & Food Technology
Collège de technologie agricole et alimentaire
d'Alfred
P.O. Box 580
Alfred, Ontario
K0B 1A0

CCAT
Centralia College of Agricultural Technology
Huron Park, Ontario
N0M 1Y0

PPD
Policy and Programs Division
Ontario Ministry of Agriculture and Food
801 Bay Street, 4th Floor
Toronto, Ontario
M7A 2B2

HRIO
Horticultural Research Institute of Ontario
Vineland Station, Ontario
L0R 2E0

KCAT
Kemptville College of Agricultural Technology
Kemptville, Ontario
K0G 1J0

NLCAT
New Liskeard College of Agricultural Technology
New Liskeard, Ontario
P0J 1P0

RCAT
Ridgetwon College of Agricultural Technology
Ridgetown, Ontario
N0P 2C0

UG
University of Guelph
Guelph, Ontario
N1G 2W1

BUDGET

1990-1991 Research Funding	Ontario Government Funding $	ARIO Trust Fund (actual expenditure) $
Technology & Field Services	247,310	-----
Education & Research Division	3,366,100	7,000
Agricultural and Food Laboratory Services	1,100,000	-----
Policy and Programs Division	750,000	-----
University of Guelph	27,527,500	-----
Horticultural Research Institute of Ontario	4,718,000	273,390
Alfred College of Agriculture and Food Technology	50,600	47,800
Centralia College of Agricultural Technology	415,100	169,990
Kemptville College of Agricultural Technology	813,300	29,960
New Liskeard College of Agriucltural Technology	1,390,000	20,640
Ridgetown College of Agricultural Technology	2,256,700	303,600
Special ARIO Trust Funds		
Red Meat Research Plan	-----	329,080
Ontario Pork Industry Improvement Plan	-----	1,370,470
Agriculture & Food Research Program	-----	2,017,770
Land Stewardship	-----	929,190
Food Systems 2002	-----	1,326,100
Red Meat II	-----	1,495,880
Total	**42,634,610**	**8,320,870**

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Chairman's Report

The fiscal year 1990-91 was one of increased activity as the Institute met nine times instead of the usual five or six, in order to develop a strategy for agri-food research in Ontario and an action plan for ARIO.

Regular program reviews took us to both OMAF and Agriculture Canada research facilities within Ontario. The executive met with Quebec Ministry of Agriculture and Fisheries, and Coordination of Research in Agriculture and Fisheries representatives to exchange information on the structure and composition of our respective groups, research facilities, and resources.

We welcomed Norris Hoag as the new Executive Director of Education and Research at the November meeting.

In March, 1991, three of the six public consultation meetings to be held throughout the province, elicited comments and opinions from those who have an interest in agriculture and food research, for the purpose of developing a long-term strategy for Ontario.

Another initiative this year was a new format for the magazine, *Highlights of agricultural and food research in Ontario*, designed to improve its readability to a wider audience.

As the fiscal year ends, we are preparing to say farewell and thanks for the leadership, commitment and inspiration to Clare Rennie, Director of Research for ARIO, and former Assistant Deputy Minister, who for the past seven months has been serving as Special Advisor, Technology for OMAF. His retirement begins on May 31, 1991.

Program Reviews

The Institute reviewed five programs. Three of these were University of Guelph and OMAF programs in plant disease control, weeds, and sheep and goat research. Also included were the University of Guelph's program in laboratory and furbearing animal research, and an interim review of its new pasture and grazing management program. Of these programs, two were accepted as presented while the other three were accepted at subsequent meetings after revisions were made to reflect the Institute's recommendations for shifting of resources.

Competitive Research

The Institute reviewed and approved a new competitive research program proposal, the Ontario Food Processing Research Program. This program is designed to maintain and

Rapport du Directeur

L'année fiscale de 1990-91 a été une année d'activité accrue puisque l'Institut a tenu neuf réunions au lieu des cinq ou six habituelles, afin de développer une stratégie pour la recherche agro-alimentaire en Ontario et un plan d'action pour l'Institut de recherche agricole de l'Ontario (IRAO).

Les révisions régulières des programmes nous ont amené aux installations de recherche du MAAO et d'Agriculture Canada en Ontario. Les cadres rencontré des représentants du Ministère de l'agriculture et des pêcheries du Québec, ainsi que de la Coordination de la recherche en agriculture et en pêcheries afin d'échanger de l'information sur la structure et la composition de nos groupes, installations de recherche et ressources respectifs.

Nous avons accueilli Norris Hoag en tant que nouveau Directeur exécutif de l'Éducation et de la recherche lors de la réunion de novembre.

En mars 1991, trois des six audiences publiques à être tenues dans la province, ont suscité des commentaires et des opinions chez ceux qui ont un intérêt dans la recherche agricole et alimentaire, au sujet du développement d'une stratégie à long terme pour l'Ontario.

Une autre initiative cette année fut un nouveau format de la revue Highlights of agricultural and food research in Ontario, qui a été conçu pour améliorer sa facilité à être lu par une audience plus étendue.

Avec la venue de la fin de l'année fiscale, nous nous préparons à dire au adieu et à remercier de son leadership, de son engagement et de son inspiration, M Clare Rennie, Directeur de la recherche pour l'IRAO et ancien assistant-député ministériel, qui ces derniers sept mois a servi en tant que Conseiller spécial en technologie pour le MAAO. Sa retraite commence le 31 mai 1991.

Révisions des programmes

L'Institut a révisé cinq programmes. Trois de ceux-ci étaient des programmes de l'Université de Guelph et du MAAO portant sur le contrôle des maladies des plantes, les mauvaises herbes, et la recherche sur les moutons et les chèvres. Les programmes de l'Université de Guelph portant sur la recherche animale de laboratoire et sur les animaux à fourrure y étaient aussi compris, ainsi qu'une révision intérimaire de ses nouveaux programmes sur la gestion des pâturages et des pacages. Parmi ces programmes, deux ont été acceptés tel que soumis, tandis que les trois autres ont été acceptés lors de réunions subséquentes après que des changements y aient été apportés pour qu'ils reflètent les recommandations de l'Institut quant au changement des ressources.

Recherche compétitive

L'Institut a revu et approuvé un nouveau projet compétitif de programme de recherche, soit le Programme de recherche sur le conditionnement alimentaire de l'Ontario. Ce programme est

increase the ability of Ontario processors to use the results of production research and development, to ensure that research and development efforts are responsive to the needs of the Ontario food processing industry, and to encourage commercial development of new opportunities in areas where the Ontario food industry is not yet established.

Regular reports were examined on the progress of the competitive research funded by other special ARIO research trust funds, including Red Meat II and the Ontario Pork Industry Improvement Plan.

Facility Tours

Institute members travelled to Quebec to meet with Quebec provincial agriculture officials, food processors, and Agriculture Canada personnel at the Food Research and Development Centre at St. Hyacinthe. A round table discussion was held with food processors from the St. Hyacinthe area. Tours were taken of the Agriculture Canada Health of Animals Laboratory, the Canadian Irradiation Centre in Laval, and the animal research farm at Macdonald College of McGill University followed.

The Institute met at the Kemptville College of Agricultural Technology where members were given the opportunity to tour the food research facilities. Agriculture Canada's London Research Centre was the site of another meeting with the opportunity to tour the facilities and to meet staff whose expertise focuses on environmental toxicology and pest control methods. Three of the centre's researchers reported on the progress of their ARIO funded projects in the Food Systems 2002, the Land Stewardship, and the Agriculture and Food Research Programs.

New or Improved Physical Facilities

As stated in previous reports, quality research requires the ongoing development of good research facilities. The Institute recommended the acquisition of three properties for research at Ponsonby, Arkell, and Ridgetown. It commends OMAF for the initiation or improvement of its research facilities over the past year. These include:

- **Alma Aquaculture Station**
  The stand-by generator and alarm system are now functional. The endocrinology building and phase II water centre will be completed by March 1992.
- **Arkell Research Station**
  The Ram Test building is completed, and the health and safety requirements for the swine and poultry research buildings have been addressed.
- **Cambridge Research Station**
  An irrigation system has been installed, and roadways in the new plot area have been completed.

conçu pour maintenir et accroître la capacité des transformateurs ontariens à utiliser les résultats de la recherche et développement portant sur la production, afin d'assurer que les efforts de recherche et de développement répondent aux besoins de l'industrie du conditionnement alimentaire de l'Ontario, et d'encourager le développement commercial de nouvelles possibilités dans des domaines où l'industrie alimentaire ontarienne n'est pas encore établie.

Des rapports réguliers portant sur les progrès de la recherche compétitive subventionnée par d'autres fonds de recherche spéciaux de l'IRAO, comprenant le Plan II de la viande rouge et le Programme d'amélioration de l'industrie du porc de l'Ontario ont été examinés.

Visite des installations

Les membres de l'Institut sont allés au Québec pour rencontrer des fonctionnaires agricoles du gouvernement provincial, des transformateurs, ainsi que le personnel d'Agriculture Canada du Centre de recherche et de développement sur les aliments de St-Hyacinthe. Il y a eu table ronde avec les transformateurs de la région de St-Hyacinthe. Il y a eu des visites du Laboratoire d'hygiène animale d'Agriculture Canada, du Centre d'irradiation du Canada à Laval, puis de la ferme de recherche animale du Collège Macdonald de l'Université McGill.

Les membres de l'Institut se sont rencontrés au Collège de technologie agricole de Kemptville où ils ont eu la chance de visiter les installations de recherche alimentaire. Le Centre de recherche de London d'Agriculture Canada a été l'hôte d'une autre réunion; les membres ont eu l'occasion d'y faire une visite des installations et de rencontrer le personnel d'experts en toxicologie de l'environnement et en méthodes de lutte phytosanitaire. Trois des chercheurs du centre ont fait état des progrès de leurs projets subventionnés par l'IRAO, soit le projet de Production alimentaire 2002, le Programme de gestion des terres et les Programmes de recherche agro-alimentaire.

Installations nouvelles ou améliorées

Tel qu'énoncé dans des rapports précédents, la recherche de qualité nécessite le développement continu de bonnes installations de recherche. L'Institut a recommandé l'acquisition de trois propriétés pour la recherche à Ponsonby, Arkell et Ridgetown. Il a recommandé le MAAO l'an dernier pour l'initiation ou l'amélioration de ses installations de recherche. Cela comprend:

- **Station d'aquaculture d'Alma**
  Le générateur d'urgence et le système d'alarme sont maintenant fonctionnels. La bâtisse d'endocrinologie et la phase II du centre hydrique seront complétées en mars 1992.
- **Station de recherche d'Arkell**
  La bâtisse expérimentale sur les moutons est complétée et les exigences de santé et sécurité pour les bâtisses de recherche sur les porcs et la volaille ont été rencontrés.
- **Station de recherche de Cambridge**
  Un système d'irrigation a été installé et des chemins ont été complétés dans la région des nouveaux terrains.

- **Elora Research Station**
  A new silo was constructed for the dairy unit. The former dairy heifer wing has been completely retrofitted to house the embryo transfer unit.

- **Guelph Research Station**
  Construction will begin on the Guelph Turfgrass Institute building in 1991.

- **New Liskeard College of Agricultural Technology**
  The new agronomy building on campus has been furnished and equipped.

- **Ponsonby Research Station**
  The swine health unit has been approved for design and construction.

- **Ridgetown College of Agricultural Technology**
  The dairy and manure storage facilities have been renovated.

Research Management

In 1990, OMAF signed a Memorandum of Understanding with Agriculture Canada on the integration of federal and provincial programs for the development and use of horticultural technology by the industry in Ontario. This agreement was made to avoid unnecessary duplication of research effort by the two levels of government and to ensure the most effective use of available resources.

Research Priorities

Each year the Institute receives and reviews the research recommendations from the Ontario Agricultural Services Coordinating Committee. ARIO recommends that, for 1991-92, the Ministry of Agriculture and Food give high priority in the planning and implementation of research programs to these six key areas, listed in order of priority as follows:

- **Agriculture and Environment Interaction**
  Maintaining natural resources and the quality of the environment is of paramount importance for plants, animals, and humans. Therefore, it is essential to conduct research leading to appropriate soil, water and air management and conservation, and to methods which prevent contamination or loss of these resources.

- **Optimal Economic Output:**
  Optimal economic output is a concept that underlies both the competitiveness of a business and its sustained viability. This establishes its long-term survival as a business enterprise and as an integral part of the natural environment. This concept should be prominent in all research conducted in the agriculture and food sectors. Optimal economic output applies, whether research is conducted on plants, animals, natural and human resources, storage, or the entire food processing and retailing sector. At the same time, it is recognized that market, product and price risk are inherent and must be managed and accounted for at all levels of the food production, processing and distributing system.

- **Station de recherche d'Elora**
  Un nouveau silo a été construit pour l'unité laitière. L'ancienne aile pour les génisses laitières a été complètement réarrangée pour y accommoder l'unité de transfert d'embryons.

- **Station de recherche de Guelph**
  La construction commencera avec la bâtisse de l'Institut du gazon de Guelph en 1991.

- **Collège de technologie agricole de New Liskeard**
  La nouvelle bâtisse d'agronomie sur le campus a été meublée et équipée.

- **Station de recherche de Ponsonby**
  La conception et la construction de l'unité de santé porcine ont été approuvées.

- **Collège de technologie agricole de Ridgetown**
  Les installations laitières et d'entreposage de fumier ont été rénovées.

Gestion de la recherche

En 1990, le MAAO a signé un Mémorandum d'entente avec Agriculture Canada sur l'intégration des programmes fédéraux et provinciaux pour le développement et l'emploi de la technologie horticole par l'industrie en Ontario. Cet accord a été établi afin d'éviter la duplication inutile des efforts de recherche par les deux paliers de gouvernement et d'assurer l'emploi le plus efficace des ressources disponibles.

Priorités de recherche

À chaque année, l'Institut reçoit et révise les recommandations de recherche du Comité de coordination des services agricoles de l'Ontario. L'IRAO recommande que, pour 1991-92, le Ministère de l'agriculture et de l'alimentation donne priorité à la planification et à la mise en oeuvre des programmes de recherche de ces six domaines-clé, qui sont ici listés par ordre de priorité:

- **Interaction entre l'agriculture et l'environnement**
  Le maintien des ressources naturelles et la qualité de l'environnement sont d'une importance extrême pour les plantes, les animaux et les humains. Alors, il est essentiel de mener de la recherche qui entraîne une gestion et une conservation appropriée des sols, de l'eau et de l'air, et des méthodes qui préviennent la contamination ou la perte de ces ressources.

- **Sortie économique optimale**
  La sortie économique optimale est un concept qui est à la base à la fois de la compétitivité d'une affaire et de sa viabilité continue. Cela établit sa survie à long terme en tant qu'entreprise d'affaire et en tant que partie intégrante de l'environnement naturel. Ce concept devrait être très important dans toute la recherche menée dans les secteurs agricoles et alimentaires. La sortie économique optimale s'applique, que la recherche soit menée sur les plantes, les animaux, les ressources naturelles et humaines, l'entreposage ou le secteur entier de la transformation alimentaire ou du commerce au détail. En même temps, on reconnait que les risques du marché, du produit et du prix sont inhérents et doivent être gérés, et qu'on doit en tenir compte à tous les niveaux de la production alimentaire, de la transformation et du système de distribution.

- **Food Quality and Safety**
  Consumers are increasingly conscious of the quality and safety of the foods they eat. When they buy food, they are interested in wholesomeness, nutrition, variety, convenience, and freshness. Improved production and control systems need to be developed to provide the level of confidence required. This relates to the development and implementation of appropriate production, processing, handling and quality/safety assurance practices throughout the agri-food industry.

- **Animal Care**
  Livestock producers and consumers are concerned with good animal care practices. Research in the areas of animal behaviour and care, which includes housing, handling management, transportation, and packing house facilities, is vital to the development of effective and realistic codes of practice. The transfer of this technology to producers is essential. Animal agriculture must continue to develop production systems that are productive and profitable, yet responsive to environmental and animal needs.

- **Sustainability in the Rural Community**
  Global economic pressures, a reconstituted rural population in which farmers form a minority, a weakening of local rural community agricultural and social infrastructures, concerns with the loss of prime agricultural farm land, as well as environmental degradation, are among factors which influence the well-being of rural communities. Sustainable rural development must balance these economic, social, and environmental factors. Research and extension efforts need to focus on: human resource development, information technology, economic and social infrastructures, work environments, rural income, employment and retraining systems.

- **Consequences of New Technology**
  There are major issues confronting the food production and processing sectors. Any consideration of these issues, whether the environment, the safety and affordability of food, the well-being of the rural population, or animal care, reveals conflicting objectives and ideals. Serious study and research are required to find a basis for the resolution of these problems, the assessment, management and understanding of the risks associated with them, as well as the application of new technologies which would be ethically sound and scientifically grounded. Biological, social, ethical and economic factors must all be taken into account in the search for solutions and in the transfer of new technologies.

Institute members are committed to excellence and quality in agri-food research. Our challenge is to continue to make it relevant to the needs of industry and society.

W. R. Grieve

W. Grieve, Chairman
ARIO

- **Qualité et sûreté alimentaire**
  Les consommateurs sont de plus en plus conscients de la qualité et de la sûreté des aliments qu'ils mangent. Lorsqu'ils achètent des aliments, ils sont intéressés à la nature saine, la nutrition, la variété, la commodité et la fraîcheur. Des systèmes de production et de contrôle améliorés doivent être développés afin de fournir le niveau de confiance requis. Cela se rapporte au développement et à l'exécution de mesures appropriées de production, transformation, manutention et assurance de la qualité/sûreté à travers l'industrie agro-alimentaire.

- **Soins des animaux**
  Les producteurs de bétail et les consommateurs se soucient des bonnes pratiques de soins des animaux. La recherche dans les domaines du comportement animal et des soins des animaux, qui comprennent le logement, la gestion de la manipulation, le transport, et les installations de transformation, est vitale au développement de codes d'éthique qui soient efficaces et réalistes. Le transfert de cette technologie aux producteurs est essentielle. L'agriculture animale doit continuer à développer des systèmes de production qui soient productifs et rentables, tout en étant responsables face à l'environnement et aux besoins des animaux.

- **Durabilité dans la communauté rurale**
  Des pressions économiques globales, une population rurale recomposée dans laquelle les fermiers forment une minorité, un affaiblissement des infrastructures agricoles et sociales de la communauté rurale locale, des questions de perte de terres agricoles de choix, de même que la dégradation de l'environnement, sont parmi les facteurs qui influencent le bien-être des communautés rurales. Le développement rural durable doit être en équilibre avec ces facteurs économiques, sociaux et environnementaux. Les efforts de recherche et de conseil doivent porter sur: le développement des ressources humaines, l'information sur la technologie, les infrastructures économiques et sociales, les environnements de travail, le revenu rural, les systèmes d'emploi et de rééducation.

- **Conséquences de la nouvelle technologie**
  Il y a des questions majeures auxquelles font face les secteurs de la production et de la transformation alimentaire. Toute prise en considération de ces questions, que ce soit sur l'environnement, la sûreté et le caractère abordable des aliments, le bien-être de la population rurale, ou des soins des animaux, révèle des objectifs et des idéaux incompatibles. Des études et de la recherche sérieuse sont nécessaires afin de trouver un dénominateur pour résoudre ces problèmes, pour évaluer, gérer et comprendre les risques qui leurs sont liés, de même que pour appliquer de nouvelles technologies qui soient valables sur le plan de l'éthique et qui soient fondées sur le plan scientifique. On doit tenir compte de tous les facteurs biologiques, sociaux, éthiques et économiques dans la recherche de solutions et lors du transfert des nouvelles technologies.

Les membres de l'Institut sont voués à l'excellence et à la qualité de la recherche agro-alimentaire. Notre défi est de continuer à la rendre applicable aux besoins de l'industrie et de la société.

W. R. Grieve

W. Grieve, Directeur
IRAO

Report of the Director of Research

The ARIO regularly reviews all research programs funded by the Ontario Ministry of Agriculture and Food. These research programs cover a broad selection of commodities and disciplines with projects that range in scope from basic to applied research. With over one thousand projects at nine main facilities, the programs are comprehensive, touching on most of the major issues and needs of the agrifood sector.

Research at OMAF funded institutions is an ongoing process with significant accomplishments in most programs every year. It would be impractical in this report to describe in detail the progress of every project. It is, however, appropriate to highlight a few of the more significant advances. More information on the results may be obtained by contacting the research establishment directly.

Livestock and Poultry Production and Health Management

A major portion of the research effort and budget is devoted to animal research reflecting the size and importance of this segment of the industry to Ontario's agricultural economy.

Major developments came in the technology associated with meat quality. Laboratory measurements for manipulating hot deboned muscle and separating protein fractions were developed. Electrical stimulation was found to reduce shear force and increase collagen solubility, both indicators of tenderness. **(UG)**

Differences in meat quality were found among breeds, but not among different protein supplementation programs. Supplementation of forage silages with true protein was found to have no advantages over urea supplementation in growth in the finishing period as well. **(UG)**

Protein blocks used in pasture trials at New Liskeard.

Blocs de protéine employés lors des essais en pâturage à New Liskeard.

Research showed that a diet of completely pelleted feed could replace the traditional hay and pellet diet in the Ontario Bull Test Program without any effect on growth, reproduction, or health of bulls and would offer an important step forward in the measurement of feed intake in the Ontario program. **(UG)**

Rapport du directeur de la recherche

Tous les programmes de recherche financés par le ministère de l'Agriculutre et de l'Alimentation de l'Ontario font l'objet d'une révision régulière de l'IRAO. Ces programmes de recherche couvrent une vast gamme de produits et de disciplines et un éventail de projets de recherche élémentaire ainsi que d'autres touchant à des problèmes spécifiques. Avec plus de 1 000 projets aux neuf installations principales, les programmes sont complets, touchant à la plupart des questions importantes et des besoins du secteur agro-alimentaire.

La recherche effectuée dans les institutions financées par le MAAO est un processus continu amenant chaque année d'importantes réalisations de la plupart des programmes. Il est impossible de mentionner dans le présent rapport le progrès accompli dans chaque projet. Pour chacun, on peut obtenir les résultats en détail en contactant directement le chercheur. Il convient toutefois de souligner quelques-uns des plus importants progrès accomplis.

Élevage du bétail et de la volaille

Une partie importante des efforts et du budget en maitère de recherche est consacrée à la rechereche sur les animaux, reflétant ainsi la dimension et l'importance de cette partie de l'industrie sur l'économie agricole de l'Ontario.

Des progrès importants ont été réalisés en matière de technologie associée à la qualité des viandes. On a mis au point des mesures de laboratoire relatives à la manipulation des muscles désossés à chaud et à la séparation des fractions protéiques. On a découvert que la stimulation électrique réduit la force de cisaillement et augmente la solubilité du collagène, deux indicateurs de la tendreté. **(UG)**

On a constaté des différences dans la qualité des viandes entre les diverses races, mais non entre les différents programmes de compléments protéiques. En outre, l'adjonction de protéines vraies aux ensilages fourragers, au cours de la période de finition, n'a pas abouti à une croissance supérieure par rapport au complément à base d'urée. **(UG)**

Des recherches ont permis de constater qu'on pouvait substituer au régime traditionnel à base de foin et d'agglomérés une alimentation composée uniquement d'agglomérés dans le programme ontarien d'évaluation des taureaux, sans que la croissance, la reproduction ou la santé des taureaux ne s'en

A large national data base of calving ease records was established at Guelph and analyzed to produce the first national 'Animal Model' sire ratings for A1 bulls. Sires got 2 ratings: one as a service sire and one on the performance of their daughters. These two ratings were negatively correlated, thus, both must be published. Dairy farmers will wish to avoid sires who perform easily as service sires at calving, but whose daughters do not perform well at calving. Of most importance is avoidance of difficult calving service sires on first pregnancy heifers. **(UG)**

Ad libitum feeding of equal parts of forage and concentrated ration to A1 dairy sires to 400 days of age reduced age at sexual maturity, allowed optimum growth, and ensured quality and quantity of semen production. **(UG)**

Freestall dairy barn with automatically controlled natural ventilation.

Étable laitière à stabulation libre avec ventilation naturelle contrôlée automatiquement.

The colostrum management program developed at KCAT reduces the need for antibiotics, lowers calf mortality and produces healthier animals. A device, which can be used by the farmer in the barn to monitor the amount of immunoglobulin in the blood, found deficiencies in the colostrum of mothers who had leaking teats or were milked before calving. Fortunately, feeding frozen colostrum and matching it to the calf's requirements boosts the power of the immune system. **(KCAT)**

Various antibiotic treatment regimes for Undifferentiated Bovine Respiratory Disease (UBDF) were investigated using calves at three Ontario feedlots over a period of two years. Long acting oxytetracycline was found to be as effective as conventional preparations; treatment for the equivalent of six days offered no advantage over four days; and Synergistin and Trivetrin were equally effective as second line antibiotics. **(UG)**

The in vitro maturation, fertilization, and culture of bovine oocytes (this process is referred to as IVM-IVF-IVC) and its development has been so successful that it is now a cheaper method of production of embryos for research than the maintenance of a donor breed. The new system involves culture of the developing embryos with oviduct cells rather than temporary transfer to a rabbit or sheep. **(UG)**

ressentent; cela permettrait de mieux mesurer la quantité d'aliments consommés comme l'exige le programme. **(UG)**

À Guelph, la création et l'analyse d'une vaste base de données nationales sur la facilité de vêlage a permis d'attribuer aux taureaux A1 les premières cotes nationales en fonction du «modèle animal». On a attribué deux cotes à chaque taureau, l'une concernant ses résultats d'inséminations, l'autre les résultats de ses filles. En raison de la corrélation négative entre ces cotes, toutes deux doivent être publiées. Les producteurs laitiers ont intérêt à éviter les taureaux bien cotés pour les inséminations, mais dont les filles ont des vêlages difficiles. Ils doivent absolument éviter de faire inséminer les génisses nullipares par des taureaux mal cotés pour la facilité de vêlage. **(UG)**

Des taureaux A1 du type laitier, nourris à volonté de fourrage et de concentrés, à parties égales, jusqu'à l'âge de 400 jours, ont atteint la maturité sexuelle plus tôt, affiché une croissance optimale et produit une semence excellente aux plans de la qualité et de la quantité. **(UG)**

Le programme d'utilisation du colostrum, élaboré au CTAK, permet d'administrer moins d'antibiotiques, de réduire la mortalité des veaux et d'améliorer la santé des animaux. Un appareil, que l'agriculteur peut utiliser dans l'étable pour contrôler la quantité d'immunoglobulines du sang, a détecté des carences dans le colostrum des vaches dont les trayons coulaient ou qui avaient été traites avant le vêlage. Heureusement, lorsque, pour répondre aux besoins spécifiques du veau, on lui fait boire du colostrum congelé, on parvient à renforcer son système immunitaire. **(CTAK)**

On a étudié pendant deux années divers traitements antibiotiques relativement à la maladie respiratoire bovine indifférenciée, sur des veaux élevés dans trois parcs d'engraissement en Ontario. On a constaté que l'oxytétracycline-retard est aussi efficace que les préparations traditionnelles; le traitement pendant l'équivalent de six jours n'a pas présenté d'avantage par rapport à celui de quatre jours; la synergistine et la trivertrine sont de même efficacité comme antibiotiques de deuxième ligne. **(UG)**

Le développement du procédé IVM-IVF-IVC (maturation, fécondation et culture in vitro d'oocytes bovins) a si bien réussi qu'il est maintenant moins coûteux de produire ainsi des embryons pour la recherche que d'entretenir une race donneuse. Le nouveau système implique la culture des embryons en croissance avec des cellules d'oviductes au lieu du transfert temporaire à une lapine ou à une brebis. **(UG)**

Tests confirm that Total Mixed Ration (TMR) is the best way to meet the feed requirements of high producing dairy cows. Feeding tests in the first 45 days of the second lactation showed a production increase of 60% over the first lactation, compared to 10% more under the regular feeding system. An automatic TMR feeder is being used to tailor feed to production. **(KCAT)**

Les essais confirment que la ration totale mélangée (RTM) est la meilleure façon de répondre aux besoins alimentaires des vaches laitières très productrices. Les vaches nourries par RTM pendant les 45 premiers jours de leur deuxième lactation ont connu une augmentation de la production de 60 % par rapport à la première lactation, comparativement à une augmentation de 10 % lorsque la vache reçoit une alimentation normale. On utilise actuellement un distributeur automatique de RTM qui ajuste l'alimentation à la production. **(CTAK)**

Changes in the structure and typical composition of the membranes appear to be major factors why frozen semen is less fertile than fresh semen. Efforts to improve the fertility of boar semen are continuing. **(UG)**

Il semble que c'est principalement à cause d'une modification de la structure et de la composition typique des membranes du sperme congelé que celui-ci est moins fertile que le sperme frais. Les travaux sur l'amélioration de la fertilité du sperme de verrat se poursuivent. **(UG)**

Data on 7562 boars tested at the New Dundee Test Station were used to study the genetics of feed conversion. Genetic correlations indicated that selection for lean growth rate increases appetite and improves feed efficiency. **(UG)**

Les données recueillies sur 7 562 verrats éprouvés à la station de New Dundee ont servi à étudier la conversion alimentaire sous l'angle de la génétique. Les corrélations génétiques indiquent que la sélection axée sur le taux de croissance et une carcasse maigre accroît l'appétit et améliore l'efficacité alimentaire. **(UG)**

Two prototype weaner decks heated with microwaves have been constructed. Performance of pigs reared on these decks has been excellent and microwaves can now be confidently recommended as heat sources for pigs. **(UG)**

Deux prototypes de planchers chauffés par micro-ondes ont été conçus pour équiper les cases à porcelets sevrés. Les porcelets élevés sur ces planchers se sont très bien portés, et les micro-ondes peuvent dorénavant être recommandées en toute confiance comme source de chaleur dans les porcheries. **(UG)**

Dust and gas levels in growing-finishing barns have been studied under a variety of conditions. Activity of pigs was determined to be the primary factor causing dust in the air. High ventilation rates and addition of fat to the diet may reduce dust but cannot overcome the problem. **(UG)**

Les concentrations de poussière et de gaz dans les porcheries d'engraissement ont été étudiées dans diverses situations. Il s'avère que l'activité des porcs est la principale cause de poussière dans l'air. On peut diminuer la poussière en augmentant la ventilation et en incorporant du gras aux aliments, mais sans régler pour autant le problème. **(UG)**

Addition of fat to diets for early-weaned pigs (21 days of age) was found to improve gain-to-feed ratio by up to 6%. Corn and coconut oil were more effective than palm oil. Increasing the level of dietary protein from 18% to 22% also improved performance of these early weaned pigs. **(UG)**

On a constaté une augmentation de 6 % de l'indice de conversion lorsque l'on ajoute du gras aux rations des porcelets sevrés tôt (21 jours). L'huile de maïs et l'huile de noix de coco ont été plus efficaces que l'huile de palme. En faisant passer la teneur protéique des aliments de 18 à 22 %, on a également amélioré la performance des porcelets sevrés tôt. **(UG)**

Research on the synthesis of the compounds responsible for boar taint has shown that it may be possible to selectively inhibit the production of these compounds in the live animal and thus prevent male pigs from producing meat with the objectionable boar taint. A chemical test for boar taint has been developed that can be used to identify tainted meat in the abattoir and thus allow untainted meat to be sold as fresh pork. **(UG)**

Des recherches sur la synthèse des composés qui communiquent à la viande de verrat son odeur sexuelle ont montré qu'il serait possible d'inhiber sélectivement la production de ces composés chez l'animal vivant et ainsi d'empêcher que la viande des mâles dégage cette odeur rebutante. On a élaboré un test chimique permettant de détecter l'odeur sexuelle à l'abattoir et d'éviter ainsi que cette viande soit écoulée en tant que viande fraîche. **(UG)**

An extensive project on stillbirths and piglet viability showed that the weight of the placenta and the strength of attachment of the piglet to the placenta are important in piglet weight and survival. Large placentas produce larger pigs and more vigorous piglets. **(UG)**

Un vaste projet sur la mortinatalité et la viabilité des porcelets a montré que le poids du placenta et la force d'attache du porcelet à ce dernier jouent un rôle important dans le poids du porcelet et sa survie. Les placentas volumineux produisent des porcelets plus gros et plus vigoureux. **(UG)**

Research into the effects of intermittent lighting regimes (1 hour light : 3 hours dark, repeated) on broilers showed that the birds grew more slowly at first and then more quickly, ending up at a similar weight and with similar food conversion ratio as the

La recherche sur les effets des régimes d'éclairement intermittent (1 heure de lumière : 3 heures d'obscurité, et ainsi de suite) dans l'élevage des poulets à griller a montré que ces oiseaux se développaient d'abord plus lentement puis plus rapidement, et

conventionally lit (23 hours light : 1 hour dark) birds. Results suggest that the birds on the intermittent lighting are very much more active during their light periods. This research was designed to investigate the incidence of 'fast growth problems' in broilers, such as sudden death syndrome, ascites, and leg problems. **(UG)**

qu'ils terminaient avec le même poids et le même indice de conversion que les poulets élevés avec le régime d'éclairement traditionnel (23 heures de lumière : 1 heure d'obscurité). Les résultats donnent à penser que les poulets sont beaucoup plus actifs au cours des périodes d'éclairement. L'objet de la recherche était de déterminer l'incidence des «problèmes de croissance rapide» dont souffrent les poulets à griller, tels que le syndrome de la mort subite, l ascite, et les problèmes de pattes. **(UG)**

Nesting behaviour of hens is being studied using four different strains of domestic fowl in obstructive tests. Essentially, the hen has to overcome some obstacles or series of obstacles in order to reach a nest site. Such observations will help us understand the apparent need of the hen to lay eggs in nests. **(UG)**

L'instinct nicheur des poules est actuellement à l'étude à l'aide de tests administrés à quatre souches différentes de volailles domestiques. Essentiellement, la poule doit surmonter certains obstacles ou suite d'obstacles pour atteindre un lieu de nichage. On espère que ce genre d'observations aidera à mieux comprendre le besoin qu'éprouve apparemment la poule de déposer ses oeufs dans un nid. **(UG)**

Primordial germ cells or their precursors can be transferred from one embryo to another to create chimeras (transgenic chickens). These chimeras are being analyzed extensively using DNA fingerprinting and other techniques. **(UG)**

Il est possible d'implanter des cellules germinales primordiales, ou les précurseurs de ces cellules, d'un embryon à un autre de façon à créer des chimères (poulets transgéniques). Ces chimères sont l'objet d'analyses poussées réalisées avec la technique des empreintes digitales d'ADN et d'autres procédés. **(UG)**

Near Infra Red Reflectance Spectroscopy (N.I.R.A.) offers an alternative system to the lengthy and costly use of live birds to determine the energy level of poultry feeds. N.I.R.A. is both rapid and very inexpensive, and can predict the metabolizable energy to within 1.8%. This technique is currently being refined and other studies initiated to look into amino acid analysis. **(UG)**

On pourrait utiliser la spectroscopie par réflexion dans le proche infrarouge pour déterminer la teneur énergétique des aliments pour volailles au lieu d'utiliser des oiseaux vivants, méthode longue et coûteuse. Ce procédé, rapide et très bon marché, permet de prédire l'énergie métabolisable à 1,8 % près. On s'emploie actuellement à le raffiner et on a entamé d'autres études sur l'analyse des acides aminés. **(UG)**

Trials are being conducted on turkey breeder males to determine if combinations of lighting regimes that induce early sexual maturity can be combined with feed restriction (adequate protein with energy restriction) programmes to reduce obesity and maintain optimum semen production for extended periods of time. The data obtained so far demonstrates that it is possible to obtain semen from toms 20-22 weeks of age without compromising semen quality. Early sexual maturity using these lighting regimes has reduced the growing period by 6-8 weeks, thereby reducing the cost of growing a turkey tom by $20.00. **(UG)**

On a effectué des essais sur des dindons reproducteurs pour déterminer si l'on pouvait avancer leur maturité sexuelle en combinant des régimes d'éclairement avec une alimentation rationnée (protéines en quantité suffisante mais énergie rationnée) de façon à réduire l'obésité et à maintenir une production optimale de semence pendant des périodes prolongées. D'après les données recueillies jusqu'à maintenant, il est possible d'obtenir de la semence de dindons âgés de 20 à 22 semaines sans que la qualité en soit compromise. La maturité sexuelle précoce ainsi obtenue a permis de réduire la période de croissance de 6 à 8 semaines et d'abaisser du même coup les frais d'élevage d'un dindon reproducteur de 20,00 $. **(UG)**

Two strains of birds, one which is susceptible to liver haemorrhage, and the other normal, were injected with iron nitrilotriacetate to induce lipid peroxidation. Results showed that the liver haemorrhage susceptible birds are also more susceptible to hepatic lipid peroxidation than normal birds. **(UG)**

On a donné à deux souches d'oiseaux, l'une sensible à l'hémorragie hépatique et l'autre normale, des injections de nitrilotriacétate de fer pour induire la péroxydation des lipides. Les résultats ont montré que la souche prédisposée à l'hémorragie hépatique est également davantage sensible à la péroxydation des lipides hépatiques que les oiseaux normaux. **(UG)**

Although indoor overwintering facilities are used extensively in western beekeeping operations, no such system is available in Ontario, nor has one been tested under Ontario bee management and climatic conditions. In October 1990, installation of environmental equipment required for the facility was begun at the Townsend Bee Laboratory. It is expected that the system will be on line for experimental studies by the Fall of 1991. **(UG)**

Alors que les apiculteurs de l'Ouest font souvent hiverner leurs abeilles sous abri, cette méthode n'est pas utilisée en Ontario, et n'a pas non plus été essayée dans les conditions de climat et d'élevage propres à l'Ontario. En octobre 1990, on a commencé à installer de l'équipement environnemental au laboratoire apicole de Townsend. Le système devrait être prêt pour les études expérimentales à l'automne de 1991. **(UG)**

Data suggest that the greater wax moth may be a suitable candidate for a management program through the use of male-produced sex pheromones. **(UG)**

Certaines données semblent indiquer que la fausse teigne de la cire soit une candidate toute désignée pour un programme de lutte faisant appel aux phéromones sexuelles produites par le mâle. **(UG)**

Bumblebees proved to be effective pollinators of greenhouse tomatoes, thereby eliminating labour costs for mechanical pollination. **(HRIO)**

Les bourdons ont montré leur efficacité en tant que pollinisateurs des tomates de serre; ils permettraient d'économiser les frais de main-d'oeuvre occasionnés par la pollinisation mécanique. **(IRHO)**

An extensive microcomputer data management study has been completed which was designed to estimate the prevalence of paratuberculosis in Ontario dairy cattle and to compare the usefulness of selected tests for its detection. Although selected dairy production indices, as well as farm management factors were identified as being associated with the occurrence of this disease, the results showed that no alterations to the current paratuberculosis control recommendations are needed. **(UG)**

On a achevé une vaste étude par gestion des données sur micro-ordinateur dans le but d'estimer la prévalence de la paratuberculose chez les bovins laitiers de l'Ontario et de comparer l'utilité de certains tests de dépistage. Bien que l'on ait repéré certains indices de production laitière et des facteurs de gestion de l'entreprise qui sont associés à l'apparition de la maladie, l'étude a montré qu'il n'est pas nécessaire de modifier les actuelles recommandations concernant la lutte contre la paratuberculose. **(UG)**

The establishment and standardization of the lymphocyte-calcium test, a blood test for diagnosis of susceptibility to porcine stress syndrome, could form the basis for cost-effective and non-invasive laboratory diagnosis of MH (malignant hyperthermia) - susceptibility - a porcine stress syndrome. **(UG)**

Grâce à l'établissement et à la standardisation du test lymphocyte-calcium, une analyse du sang servant au diagnostic de la sensibilité des porcs au syndrome du stress, on pourrait mettre au point un procédé de laboratoire, de bon rapport coût-efficacité et non effractif, qui permettrait de diagnostiquer la sensibilité à l'hyperthermie maligne — un syndrome du stress porcin. **(UG)**

Reduction of leg weakness and lameness in broiler chickens and turkeys can only be accomplished by slowing growth rate if broilers are on an adequate diet. Although leg problems are the second largest cause of loss due to disease in broilers, it is not clear whether slowing growth rate is an economical way to prevent the problem. **(UG)**

Ce n'est qu'en ralentissant le taux de croissance des volailles ayant un régime convenable qu'on parviendra à réduire l'incidence de la faiblesse des pattes et de la boiterie chez les poulets à griller et les dindons. Bien que les problèmes de pattes soient, en importance, la deuxième cause de maladie chez les poulets, il n'est pas certain que le ralentissement du taux de croissance soit un moyen économique d'éviter le problème. **(UG)**

Researchers have developed a new technique for transcervical insemination of sheep using semen frozen with a method developed in the program. Working closely with United Breeders Inc. in this project, they have been able to develop and manage a ram stud, where 25 rams have been kept under artificial lighting and have been studied for the effects of this artificial environment on fertility. Field trials using these techniques will continue. **(UG)**

Les chercheurs ont élaboré un nouveau procédé d'insémination transcervicale des brebis avec de la semence congelée à l'aide d'une méthode élaborée dans le cadre du programme. En collaboration étroite avec United Breeders Inc., les chercheurs ont pu mettre sur pied et gérer un centre d'insémination ovine, où ils ont maintenu 25 béliers sous éclairage artificiel afin d'étudier les effets de cette condition sur leur fertilité. Ces techniques continuent à faire l'objet d'essais pratiques. **(UG)**

Research on mink at the OVC has been both problem oriented, and aimed at establishing basic production parameters. Early studies revealed that the greatest economic loss in the mink industry occurred between the end of breeding season and before weaning of young mink. Adult mortality was greatest during the lactation period. Mastitis and two poorly understood conditions, "nursing disease" and "weaning stress" were found to be the most important diseases. There is almost no scientific literature available describing the latter two conditions. **(UG)**

La recherche sur le vison au CVO a été axée sur la résolution de problèmes et l'établissement de paramètres fondamentaux de production. Il est ressorti d'études antérieures que les élevages de visons subissent les plus lourdes pertes économiques entre la fin de la saison de reproduction et le début du sevrage des jeunes. C'est pendant la lactation que la mortalité était la plus élevée chez les adultes. La mammite, et deux affections mal comprises, la «maladie de l'allaitement» et le «stress du sevrage», se sont avérées les plus importantes. Il n'existe pratiquement pas de description de ces deux dernières maladies dans la documentation scientifique. **(UG)**

Investigation of bacterial adenitis disease in baby mink led to the identification and characterization of an apocrine skin gland located in the back of the neck. Studies showed that this gland was present at birth, reached maximum size at 3 weeks of age

L'étude de l'adénite bactérienne chez les visons nouveau-nés a permis d'identifier et de caractériser une glande cutanée apocrine située à l'arrière du cou. On s'est aperçu que cette glande existe à la naissance, atteint sa taille maximale à l'âge de trois semaines et

and regressed at the time of weaning. Secretions from this gland appeared to stimulate maternal behaviour and mothering instincts in adult female mink. **(UG)**

s'atrophie au sevrage. Les sécrétions de cette glande semblent stimuler l'instinct et le comportement maternel chez les mères. **(UG)**

Pasteurellosis causes respiratory disease, systemic abcessation, and reproductive failure in older rabbits. The addition of tetracycline to the drinking water, although commonly used, does not appear to be an effective method of treating the disease. **(UG)**

La pasteurellose cause des troubles respiratoires, une abcédation systémique et un arrêt de la reproduction chez les lapins âgés. L'ajout de tétracycline à l'eau de boisson, bien que pratiquée couramment, ne semble pas être un traitement efficace. **(UG)**

Rhodococcus equi is an important disease-causing organism of the horse, accounting for an estimated 45% of all foal pneumonia and 10% of foal deaths in Ontario. Significant progress has been made in the purification of the prominent cholesterol oxidase exoenzyme (equi factor) of *R. equi*. It is hypothesized that the antibody to the enzyme may be important in protecting foals against infection. **(UG)**

Le Rhodococcus equi est un important organisme pathogène du cheval qui est responsable, chez les poulains en Ontario, de 45 % de toutes les pneumonies et de 45 % des morts, chiffres estimatifs. Un progrès énorme a été réalisé dans la purification de l'importante exoenzyme oxydase du cholestérol («equi facteur») du R. equi. On suppose que l'anticorps de l'enzyme joue un rôle majeur dans la protection des poulains contre l'infection. **(UG)**

The post-exercise pattern of respiration and the rate of return to normal heart rates are indicative of the degree of training and/or disease affecting these body systems of horses. Cardiac ultrasound methods were established for the horse and were used to assess the response to training. This technology and background information established cardiac ultrasonography as a supplemental diagnostic service in the Veterinary Teaching Hospital. **(UG)**

Le rythme respiratoire post-exercice et la vitesse de retour à la normale du rythme cardiaque sont indicatifs du degré d'entraînement et de maladie affectant ces systèmes corporels chez le cheval. Des méthodes d'études du coeur par ultrasons ont été établies pour le cheval et utilisées pour évaluer sa réponse à l'entraînement. Cette technologie ainsi que les données fondamentales ont permis d'établir l'ultrasonographie cardiaque comme un service de diagnostic complémentaire au Veterinary Teaching Hospital. **(UG)**

In nutritional studies, the dietary requirements of trout were determined for biotin, leucine, and arginine. A 90% reduction of the very expensive biotin in the premix, and plant protein as a substitute for fish meal reduced feed costs. The limits for 'least cost' open formula diets were redefined. **(UG)**

Des études sur la nutrition ont permis de déterminer les taux de biotine, de leucine et d'arginine dont les truites ont besoin dans leur alimentation. En réduisant de 90 % la biotine, produit très coûteux, dans le prémélange et en remplaçant la farine de poisson par des protéines d'origine végétale, on a abaissé les coûts de l'aliment. Les contraintes des formules ouvertes «à moindre coût» ont été redéfinies. **(UG)**

Research isolated, cultured, identified and established the infectiousness of the organism which causes bacterial gill disease of trout. **(UG)**

La recherche a isolé, cultivé, identifié et établi l'infectiosité de l'organisme qui cause la maladie bactérienne des branchies chez les truites. **(UG)**

The first methods for genetic tests to diagnose Infectious Pancreatic Necrosis and gram negative bacterial diseases of fish were developed. **(UG)**

On a élaboré les premières méthodes de tests génétiques pour diagnostiquer la nécrose pancréatique infectieuse et les maladies causées par les bactéries chez les poissons. **(UG)**

A model was developed to compare inbreeding and selection response for various mating schemes, to help trout farmers on the best selection program for their breeding system. **(UG)**

On a mis au point un modèle permettant de comparer la consanguinité et la réponse à la sélection selon divers schémas de croisements afin d'aider les pisciculteurs à trouver le meilleur programme de sélection pour leur type d'élevage. **(UG)**

A model was developed to improve the design of waste treatment works for fish farms. **(UG)**

On a créé un modèle destiné à améliorer la conception des usines de traitement des déchets dans les fermes piscicoles. **(UG)**

Criteria were established for reuse and disposal practices for fish waste. **(UG)**

Des critères relatifs aux pratiques de recyclage et d'élimination des déchets des poissons ont été établis. **(UG)**

Agricultural Engineering

Engineering research focused on livestock housing, sprayer technology, and the storage and utilization of crops and agricultural by-products.

Thin-layer drying apparatus to determine the characteristic drying behaviour of seeds and granular material has been built, and preliminary results for canola have been reported. The monitoring equipment for measurement of thermal properties of particles in a packed bed is also nearing completion. Both pieces of equipment are permanent fixtures in the thermophysical properties lab which will be used for routine evaluation of drying parameters for new materials. **(UG)**

Environmental mini-barn housed inside an environmental chamber.

Mini-é table environnementale logée à l'intérieur d'une chambre d'ambiance.

A long term (375 days) experimental test was conducted that investigated the problem of moisture migration into polyurethane foam insulation (PUFI) in farm buildings under the influence of thermally induced vapour pressure gradients. A test mini-barn, housed inside an environmental chamber, simulated the environmental conditions inside and outside a swine barn. Results indicated that moisture will migrate into PUFI under these conditions, and that some current construction methods may need revision. **(UG/OMAF)**

Average bulk density values for barley silage were determined for moisture contents of 40, 50, and 60% and for seven common sizes of farm tower silos. This information, along with the results of indirect friction tests, can now be incorporated into the Canadian Farm Building Code. **(UG)**

Compact stick-on style dataloggers can now be used to provide time-temperature profiles of produce in storages or in transit. This technology provides a convenient miniaturized system of monitoring and ensuring quality throughout the post-harvest food distribution system. **(HRIO)**

A new research project will concentrate on pathways and processes that contribute to bacterial movement through unsaturated soil from the application of either liquid agricultural wastes (manure and milkhouse waters) or effluent from septic tanks. A mathematical model relating the pollution potential of agricultural waste spreading and the various parameters and independent variables will be developed. **(UG)**

Génie agricole

La recherche technique s'est concentrée sur le logement du bétail, ainsi que sur l'entreposage et l'utilisation des récoltes et de sous-produits agricoles.

On a construit un appareil permettant de sécher des matériaux en couches minces pour déterminer le comportement caractéristique des graines et des matériaux granulaires pendant le séchage, et les résultats préliminaires de cette étude sur le Canola ont été publiés. On a presque terminé la construction de l'appareil de détection mesurant les propriétés thermiques des particules sur lit fixe. Ces deux appareils sont installés à demeure dans le laboratoire des propriétés thermophysiques qui servira à l'évaluation courante des paramètres du séchage des matériaux nouveaux. **(UG)**

On a réalisé un essai de longue durée (375 jours) pour étudier le problème de la migration de l'humidité dans l'isolant en mousse de polyuréthane sous l'influence de gradients de pression de vapeur d'eau induits par la température. Une mini-étable test, logée à l'intérieur d'une enceinte environnementale, a simulé les conditions d'ambiance qui règnent à l'intérieur et à l'extérieur d'une porcherie. D'après les résultats, l'humidité migre effectivement dans la mousse de polyuréthane en présence de ces conditions et il serait bon de revoir certaines méthodes actuelles de construction. **(UG/MAAO)**

On a déterminé la densité apparente moyenne de l'ensilage d'orge à 40, 50 et 60 % d'humidité et pour sept dimensions courantes de silos-tours de ferme. Cette information, ainsi que les résultats des tests de friction indirecte, peut maintenant être incorporée dans le Code canadien de construction des bâtiments agricoles. **(UG)**

On peut désormais utiliser des enregistreurs compacts, accrochables, pour obtenir les données température-temps en ce qui concerne les fruits et légumes frais pendant le transport ou l'entreposage. Ce procédé pratique et miniaturisé permet de surveiller la température et de s'assurer de la qualité des denrées tout au long du circuit de distribution de l'après-récolte. **(IRHO)**

Un nouveau projet de recherche portera sur les chemins et les phénomènes qui contribuent à la migration dans les sols insaturés des bactéries provenant de l'épandage de déchets agricoles liquides (lisier ou eaux usées de laiterie) ou d'effluents de fosses septiques. On procédera à la mise au point d'un modèle mathématique faisant le lien entre le potentiel de pollution engendré par l'épandage des déchets agricoles et divers paramètres et variables indépendantes. **(UG)**

Two pilot treatment plant systems will be installed in the new dairy barn at Alfred College to handle milkhouse waste disposal. **(ACAFT)**

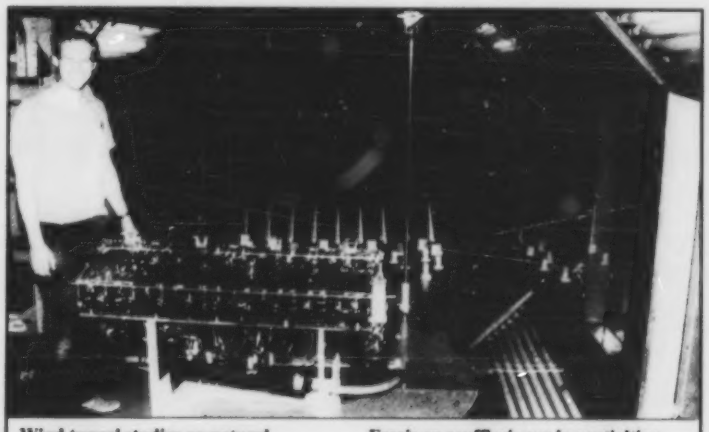
Deux installations pilotes d'épuration seront construites dans la nouvelle étable du Collège d'Alfred pour l'élimination des eaux usées de laiterie. **(CTAAA)**

Polyurethane insulation sprayed directly onto metal siding absorbs water if it is used in high humidity buildings, such as potato storages. The encapsulated parts of the timber structure rot quickly and in some cases the buildings have collapsed. Two years of testing have shown that polyurethane insulation does absorb water under high humidity if the cold side fluctuates frequently from freezing to thawing, and at the same time reduces the insulation value. Recommendations will be made after all samples and temperature data have been analyzed. **(UG)**

La mousse de polyuréthane pulvérisée directement sur le recouvrement métallique absorbe l'eau lorsqu'elle sert à isoler des bâtiments très humides comme les entrepôts à pommes de terre. Les parties de la charpente de bois qui se trouvent noyées dans l'isolant pourrissent rapidement, et on a même signalé des cas d'effondrement. Deux années de tests ont montré que l'isolant se gorge d'eau et perd donc son efficacité d'isolation lorsque l'humidité est élevée et que le côté exposé au froid subit de fréquentes alternances gel-dégel. Des recommandations seront émises après analyse de tous les échantillons et données de température. **(UG)**

The design of naturally ventilated buildings has traditionally been based on the builders' experience of local weather conditions. From recent wind tunnel experiments, a precise mathematical model for natural ventilation is currently being computerized to optimize the design of the sidewall, end wall and ridge opening areas and to determine the preferred orientation of naturally ventilated buildings for livestock housing and single arch greenhouses across Ontario. **(ACAFT)**

Traditionnellement, c'est sur leur expérience des conditions climatiques locales que les constructeurs déterminaient la façon dont ils concevaient les bâtiments à ventilation naturelle. Grâce à des expériences faites récemment dans des soufflerie, on travaille à informatiser un modèle mathématique précis de ventilation naturelle pour optimiser la conception des prises d'air dans les murs latéraux, les murs de pignon et le faîte, et pour déterminer l'orientation qu'il vaut mieux donner aux bâtiments d'élevage à ventilation naturelle et aux serres unichapelles dans tout l'Ontario. **(CTAAA)**



Wind tunnel studies on natural ventilation.

Essais en soufflerie sur la ventialtion naturelle.

Hydrogen sulphide, the poisonous component of manure gas, is released when stored manure is agitated. Data suggest that a warning sensor placed in the barn can prevent the buildup of hydrogen sulphide by sounding an alarm when the gas reaches a critical concentration. The operator can then shut down the agitator to allow the ventilation system to reduce the gas levels within the barn. This warning device is currently being developed at Guelph. **(UG)**

Il y a dégagement d'hydrogène sulfuré, l'élément toxique du gaz de fumier, lorsque le fumier entreposé est agité. Il semble d'après certaines données qu'un capteur placé dans l'étable pourrait détecter l'accumulation d'hydrogène sulfuré et faire retentir une alarme lorsque ce gaz atteint une concentration critique. L'agriculteur pourrait alors arrêter l'agitateur de fumier pour permettre au système de ventilation de réduire les niveaux de gaz à l'intérieur de la grange. Ce dispositif d'alarme est actuellement mis au point à Guelph. **(UG)**

The average nitrate nitrogen concentration of tile drainage water from selected fields in the Parkhill Creek watershed over a 3 year period was 10.6 mg/L (slightly exceeding the province's drinking water standard). Major sources appeared to be fertilizer nitrogen, manure, and crops that fix nitrogen. A 'nutrient management' approach should help to lower this number. **(CCAT)**

Selon les données recueillies sur 3 ans, l'eau acheminée par les canalisations de drainage de certains champs du bassin versant de Parkhill Creek avait une teneur moyenne en azote nitrique de 10,6 mg/L (ce qui dépasse légèrement la norme provinciale pour l'eau potable). Ce produit provient surtout des engrais azotés, du fumier, et des cultures fixatrices d'azote. On devrait pouvoir en réduire la concentration par des méthodes d'utilisation rationnelle des fertilisants. **(CTAC)**

A hydraulic boom sprayer to apply foliar pesticides in vegetable crops has been designed to reduce spray drift by using a forced air shield set behind the hydraulic boom. The air-curtain feature resulted in more pesticides being deposited onto the crop target, suggesting the possibility of reduced rates of pesticides

On a conçu un pulvérisateur à pression à jet projeté pour épandre des pesticides foliaires sur les cultures légumières de manière à réduire la dérive du pesticide projeté, en créant à l'arrière de l'appareil un écran formé par de l'air pulsé. On a constaté que grâce à cet écran, les légumes visés reçoivent plus de

required for future applications with this spraying system. **(RCAT)**

pesticides, et on espère donc que l'appareil permettra de réduire les quantités de pesticides nécessaires. **(CTAR)**

Field Crops Research

A major component of Ontario agriculture and consequently, OMAF research is a broad range of crops for both animal and human consumption.

Research in tillage systems and crop rotation involving corn continued in 1990. Results have led researchers to conclude that certain (but not all) conservation tillage systems are able to maintain corn yield similar to those of conventional tillage; that zero tillage, even with planter modifications, results in consistent yield reduction when corn follows corn in the rotation; and that interrow cultivation does not enhance yield of corn with either conventional or conservation tillage systems when weeds are not present. These results indicate that crop rotation and conservation tillage systems need to be adopted simultaneously on most soil types to sustain profitability and reduce soil erosion. **(UG)**

During 1990/91, the program completed evaluation and received support for registration of three new wheat varieties. Two of these, a hard red spring wheat and a soft white winter wheat will be released for commercial seed multiplication during 1991, the third, also a hard red spring type, in 1992. **(UG)**

An adapted cultivar of barley was used to assess the relative importance of various production factors including increased seeding rates, minimum and optimum rates of fertilizers, fungicides and chemical weed control, in comparison to the basic production system where no commercial products were used. The basic production system yielded 2,615 kg/ha while the best combination of all inputs yielded 5,686 kg/ha. **(NLCAT)**

Limestone trials in the Parry Sound district.

Essais de pierre à chaux dans les district de Parry Sound.

An experimental cereal crop, hull-less oat, sounds almost too good to be true for advocates of sustainable agriculture. The hull-less variety can produce good yields, build the soil and flourish on class three land. Viewed as an alternative to corn and soybeans, it has the energy content of grain corn and contains up

Grandes Cultures

La vaste gamme des cultures destinées à la consommation tant animale qu'humaine constitue une composante majeure de l'agriculture ontarienne et, conséquemment, de la recherche du MAAO.

Les recherches se sont poursuivies en 1990 sur les méthodes culturales de conservation et les rotations de cultures applicables au maïs. Les chercheurs en ont tiré plusieurs conclusions : certaines façons culturales de conservation (pas toutes) permettent d'obtenir le même rendement en maïs que les méthodes traditionnelles; le semis direct, même avec des semoirs spécialement adaptés, entraîne une réduction constante du rendement dans le cas de culture continue de maïs; la culture intercalaire n'améliore pas le rendement du maïs que ce soit avec les méthodes traditionnelles ou de conservation, lorsqu'il n'y a pas de mauvaises herbes. Par conséquent, il serait nécessaire d'associer les méthodes de rotation et les méthodes culturales de conservation, sur la plupart des types de sol, pour maintenir la rentabilité et réduire l'érosion. **(UG)**

Au cours de 1990-1991, trois nouvelles variétés de blé ont été évaluées et proposées à l'enregistrement dans le cadre du programme de recherches sur les céréales. Deux de ces variétés, un blé de force roux de printemps et un blé tendre blanc d'hiver, seront mises au commerce en 1991 en vue de la multiplication, et la troisième, également un blé de force roux de printemps, le sera en 1992. **(UG)**

On a utilisé un cultivar d'orge adapté pour évaluer l'importance relative de divers facteurs de production — taux de semis accrus, taux minimaux et optimaux d'engrais, de fongicides et de désherbants chimiques — par rapport à un système de production de base qui ne fait pas appel à des produits commerciaux. Le système de base a donné un rendement de 2 615 kg/ha tandis que la meilleure combinaison de tous les facteurs de production a donné 5 686 kg/ha. **(CTANL)**

L'avoine nue, une céréale expérimentale, aurait des qualités presque trop bonnes pour être vraies, à en croire les apôtres de l'agriculture durable. L'avoine nue peut donner de bons rendements, améliorer le sol et prospérer sur des terres de classe III. Considérée comme un substitut possible du maïs et du soya,

to 20% high quality protein. Improved, cleaner threshing lines have been identified. **(KCAT)**

The forage program received support for registration of two Orchardgrass varieties (OSG-13 and OSG-16) which will be released for commercial multiplication in 1991 and 1992, respectively. Preliminary results of research in forage and turf species have indicated that Ontario has excellent potential for production of perennial ryegrass and tall fescue seeds. Evaluation of seed production is continuing for Kentucky bluegrass, tall fescue, hard fescue, bent grass and Chewing's fescue. **(UG)**

During 1990 support was received for registration of two new soybean varieties, one peanut variety, and one pinto bean variety, all of which were multiplied for commercial release. **(UG)**

Research on planting dates indicates soybeans are a very stable crop for Eastern Ontario. Ten years of records have shown that crops planted during the month of May yield uniformly but the yield drops off for crops planted through the month of June. Odds favour an early planting date for farmers, even though frost is a risk. However, clay soils produce poor yields if the beans are planted when the land is not dry enough to work. **(KCAT)**

The O.M.A.F. soybean breeding program at RCAT released two soybean cultivars to seed growers this year. The first, RCAT Angora, is a high-yielding, yellow hilum, full-season cultivar with resistance to phytophthora root rot. The second cultivar, RCAT 8803, is a mid-season, high-yielding cultivar with good tolerance to phytophthora root rot and with excellent standability. **(RCAT)**

l'avoine renferme la même teneur en énergie que le maïs-grain et jusqu'à 20 % de protéine de qualité supérieure. Des lignées améliorées, se prêtant mieux au battage, ont été identifiées. **(CTAK)**

Dans le cadre du programme des fourrages, deux variétés de dactyle pelotonné (OSG-13 et OSG-16) ont été proposées à l'enregistrement et seront mises à la disposition des semenciers pour la multiplication en 1991 et 1992 respectivement. Selon les résultats préliminaires des recherches sur les espèces fourragères et de gazon, l'Ontario pourrait être un excellent producteur de semences d'ivraie vivace et de fétuque élevée à gazon. L'évaluation de la production de semences se poursuit en ce qui concerne le pâturin des prés, la fétuque élevée, la fétuque ovine durette, l'agrostide commune et la fétuque rouge gazonnante. **(UG)**

En 1990, deux nouvelles variétés de soya, une variété d'arachide et une variété de haricots pinto ont été proposées à l'enregistrement; toutes ont été multipliées en vue d'une mise au commerce. **(UG)**

Il ressort de la recherche sur les dates d'ensemencement que le soya est une culture très stable pour l'est de l'Ontario. Les données recueillies au long de dix années montrent que les semis de mai donnent un rendement uniforme mais que le rendement baisse avec les semis de juin. Les agriculteurs ont les meilleures chances de réusssite en semant tôt, malgré le risque de gel. Toutefois, il faut s'attendre à de mauvais rendements lorsque le soya est semé dans une terre argileuse trop humide pour être travaillée. **(CTAK)**

Dans le cadre de son programme d'amélioration génétique du soya, réalisé au CTAR, le MAAO a mis deux cultivars de soya à la disposition des semenciers cette année. Le premier, RCAT Angora, est un cultivar de haut rendement, à hile jaune, de pleine saison, résistant à la phytophtoriose des racines. Le deuxième cultivar, RCAT 8803, est un cultivar de mi-saison, à haut rendement, doté d'une bonne tolérance à l'égard de la phytophtoriose des racines et d'une d'excellente résistance à la verse. **(CTAR)**

Food Research

Significant research funding flows from OMAF into the preservation of locally grown food products in order to help increase efficiency, self-sufficiency and to help our industry compete with imported products.

A delectable, nutritious, frozen dessert is being developed using the white pea bean. Its high carbohydrate content and fairly good protein source give it acceptable emulsifying and stabilizing properties for this use. A consumer taste panel has favourably accepted the finished product's eating quality, appearance and flavour. Current experimentation is concentrating on 'mouth feel'. **(CCAT)**

Alimentation

Le MAAO a alloué des fonds de recherche importants à l'industrie de la conserverie des produits alimentaires locaux afin qu'elle devienne plus efficiente et auto-suffisante et pour l'aider à concurrencer les produits importés.

Un dessert surgelé, délectable et nutritif, a été mis au point à partir de petits haricots ronds blancs. Par sa teneur élevée en glucides et relativement bonne en protéines, le haricot a des propriétés émulsifiantes et stabilisantes acceptables pour une telle utilisation. Un jury de dégustateurs a apprécié la qualité gustative, l'aspect et le goût du produit fini. Actuellement, les expériences portent sur les sensations buccales procurées par cet aliment. **(CTAC)**

A bean pizza and pita bread were among the baked products rated highly by a small taste panel. The brown and cranberry beans are the two easiest coloured beans to work with and are excellent for use in pastry. More detailed consumer tasting will follow. **(CCAT)**

Une pizza et du pain pita à base de haricots secs figuraient parmi les produits de boulangerie qui ont été très bien notés par un jury restreint de dégustateurs. Les haricots bruns et les haricots canneberge sont les haricots colorés les plus faciles à travailler et leur emploi est tout indiqué en pâtisserie. Des essais de dégustation plus détaillés vont suivre. **(CTAC)**

Anthocyanin type pigments found in grape skins are gaining importance as a natural red food colorant. The grape hybrid V.65115 developed at HRIO is unique in that it has the highest natural pigment content of all known grape cultivars in the world. Its highly coloured juice has potential as a natural food colorant and since it is a juice (and not an extract) does not require any label declaration. **(HRIO)**

Des pigments du genre anthocyanine, contenus dans la peau du raisin, commencent à jouer un rôle important comme colorant rouge alimentaire naturel. Le raisin hydride V.65115, créé par l'IRHO, est unique parce qu'il est, de tous les cultivars de raisin connus de par le monde, le plus riche en pigment naturel. Son jus très coloré est intéressant pour la production de colorant alimentaire naturel et, comme c'est un jus (et non un extrait), on n'est pas tenu de le mentionner sur l'étiquette de l'aliment. **(IRHO)**

Work in minimal processing has lead to the development of new cold blended strawberry sauces suitable for use by fast food industries. These innovative value-added products have natural quality and flavour because their preparation does not involve cooking which might cause flavour loss. **(HRIO)**

Des travaux sur la transformation minimale ont abouti à l'élaboration de nouveaux coulis de fraises, préparés à froid, dont l'emploi convient à la restauration rapide. Ces produits novateurs, à valeur ajoutée, ont une qualité et un goût naturels parce que leur préparation n'implique pas de cuisson susceptible d'en altérer la saveur. **(IRHO)**

Strawberry breeding program ready for cultivar release.

Le programme d'amélioration génétique des fraises est prêt pour le lancement des cultivars.

Research into potential binding agents for restructured steaks has identified gelatin as having superior binding properties over other protein and plant binders tested. **(KCAT)**

Les recherches sur les agents liants pouvant servir à la fabrication de steaks restructurés ont permis de découvrir que les propriétés liantes de la gélatine sont supérieures à celles des autres liants protéiques et végétaux testés. **(CTAK)**

The first phase of research evaluating the amino acid, fatty acid, cholesterol, and mineral content of beef, white veal, and red veal fed on barley or corn is complete. Data are now available for the meat industry or for inclusion in nutrient data banks to provide definite information regarding the composition of these meats. **(KCAT)**

On a achevé la première phase de la recherche destinée à évaluer les teneurs en acides aminés, en acides gras, en cholestérol et en minéraux de la viande de bovins, de jeunes veaux et de veaux lourds nourris d'orge ou de maïs. Les données sont désormais mises à la disposition du secteur de la viande ou seront versées dans les banques de données sur les éléments nutritifs afin de fournir des renseignements précis sur la composition de ces viandes. **(CTAK)**

Results obtained on Ontario-grown potatoes provide important information for the manufacturing of chips and other potato products. They also demonstrate perfectly the importance of the raw material properties on the subsequent quality of the manufactured products, and illustrate the link between growing practices and processing. **(UG)**

Les résultats obtenus avec des pommes de terre cultivées en Ontario fournissent d'importants renseignements sur la fabrication des croustilles et d'autres produits à base de pomme de terre. Ils démontrent aussi parfaitement le rôle important des propriétés de la matière première dans la qualité ultérieure des produits manufacturés et illustrent le lien entre pratiques de culture et transformation. **(UG)**

New milk fermentation products have been developed using strains of bifidobacterium and lactobacillis acidophilus. One such product is being used in clinical studies in the Department of Pediatrics at the State University of New York for infants and

Des nouveaux produits de la fermentation du lait ont été élaborés à partir de souches de Bifidobacterium et de Lactobacillus acidophilus. Un de ces produits est utilisé dans des études cliniques, menées par le département de pédiatrie de

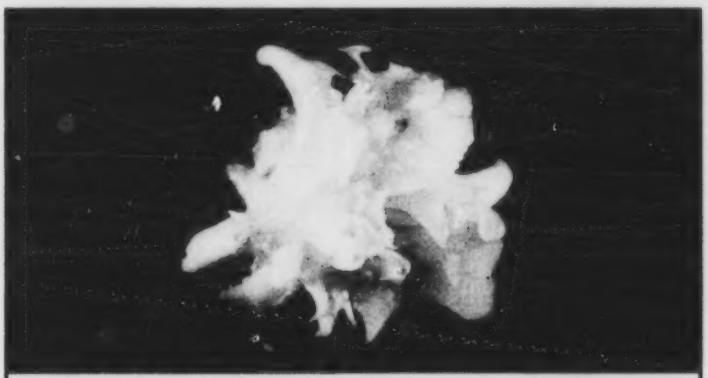
children suffering from intestinal disorders. As a result, in-plant conditions are now being tested to produce this product commercially and evaluate its shelf-life. **(UG)**

l'Université de l'État de New York, sur des nourrissons et des enfants souffrant d'affections intestinales. On s'attache donc maintenant à tester les conditions de fabrication en usine de ce produit et à en évaluer la durée de conservation à l'étalage. **(UG)**

Horticultural Crops Research

Horticultural research sponsored by OMAF supports a diverse industry including fruit, vegetables, ornamental and floral crops, and turfgrass.

The development of high yielding asparagus cultivars adapted to Canadian conditions will enhance production and market competitiveness. **(UG)**



Development of somatic embryos from embryonic anther callus for cloning of potential supermales for breeding.

Développement d'embryons somatiques à partir de bourrelet d'anthères embryonnaires pour le clonage de supermâles potentiels destinés à la sélection.

Two new potato cultivars were released: *Banana*, a yellow-fleshed fingerling potato for the novelty market (from the Guelph program), and *Niska*, extensively tested at Guelph from the Wisconsin-Alberta program, a promising chipping variety. **(UG)**

Field performance of selected breeding lines of rutabaga was evaluated for resistance to turnip mosaic virus (TuMV) at Centralia and Cambridge. Roots will be assessed for storage potential and flavour, and selected roots further selected for absence of TuMV during silique formation. **(UG)**

Three hybrid cultivars of tomatoes with characteristics superior to commercially available cultivars for fast food use have been identified. Desired characteristics include firmness, uniform ripening, medium fruit size, and holding ability. **(HRIO)**

Multiple seeding of lettuce in the greenhouse, and subsequent planting of six or more cultivars allowed for sequential harvesting of lettuce on mineral soils and the gathering of data to assess yield and quality. **(HRIO)**

In 1990, the third year of a four year project, techniques to cure or dry alternate crops in tobacco kilns were investigated. Crops conditioned were ginseng, sweet potatoes, peanuts, garlic, stevia, and fresh cut flowers. Kilns were also used to store sweet potatoes after curing. Results indicate that these crops can be successfully conditioned in tobacco kilns provided that the appropriate air conditions are utilized, which sometimes requires modifications to the kilns. **(HRIO)**

Cultures horticoles

La recherche horticole parrainée par le MAAO appuie une industrie diversifiée couvrant les fruits, les légumes, les cultures ornementales et florales, ainsi que le gazon.

La création de cultivars d'asperges à haut rendement adaptés aux conditions canadiennes améliorera la production et la compétitivité commerciale. **(UG)**

Deux nouveaux cultivars de pommes de terre ont été lancés : Banana (issu du programme de Guelph), une mini-pomme de terre à chair jaune pour le marché des légumes fantaisie, et Niska (issu du programme Wisconsin-Alberta), une variété à croustilles d'un grand avenir qui a été longuement testée à Guelph. **(UG)**

Des géniteurs sélectionnés de rutabaga ont été cultivés en plein champ et évalués pour la résistance au virus de la mosaïque du navet (TuMV) à Centralia et à Cambridge. Ces légumes-racines seront aussi évalués du point de vue du goût et de l'aptitude à la conservation, et les sujets sélectionnés subiront une deuxième sélection axée sur l'absence de TuMV pendant la formation des siliques. (UG)

On a découvert trois cultivars hybrides de tomates dont les caractéristiques surclassent celles des cultivars actuellement employés dans la restauration rapide. Les caractéristiques recherchées incluent la fermeté, l'uniformité de la maturité, une taille de fruit moyenne et l'aptitude à la conservation. **(IRHO)**

Des semis multiples en serre et un repiquage de six cultivars ou plus de laitue sur des sols minéraux ont permis d'étaler la période de récolte et de recueillir des données servant à évaluer le rendement et la qualité. **(IRHO)**

En 1990, troisième année d'un projet de quatre ans, on a étudié des techniques permettant de faire sécher d'autres végétaux dans les séchoirs à tabac. Les cultures ainsi traitées ont été le ginseng, la patate douce, l'arachide, l'ail, le stevia et les fleurs fraîches coupées. Les séchoirs ont également servi à entreposer des patates douces après le préstockage. Au vu des résultats, il est possible de traiter les cultures précitées dans les séchoirs à tabac lorsqu'on prend soin d'y faire régner des conditions d'ambiance appropriées, ce qui oblige parfois à des modifications. **(IRHO)**

Studies have demonstrated that temperature is likely an indirect modifier of plant response to ozone, in that breathing pore closure usually associated with increased temperature was actually due to increased vapour pressure deficit. **(UG)**

Selon certaines études, il se pourrait que la température modifie indirectement la réponse de la plante à l'ozone, en ce sens que la fermeture des lenticelles, qui se produit en général lorsque la température monte, est en fait provoquée par un déficit accru de la pression de vapeur d'eau. **(UG)**

Over 6000 red raspberry seedlings from crosses between parents with excellent fruit quality and disease resistance and parents with high yield and winter hardiness were planted at Cambridge in 1989. Preliminary observations in 1990 indicated family differences in vigour, quality, and winter hardiness. More detailed observations during 1991 will identify selections to be placed in advanced screening trials or yield trials. Many of the seedlings carry genes for aphid/virus resistance - a pest which shortens life expectancy of raspberry plantations. **(UG)**

En 1989, on a planté à Cambridge plus de 6 000 jeunes plants de framboisiers obtenus par croisement entre d'une part, des parents notés pour la qualité excellente de leurs fruits et leur résistance à la maladie et d'autre part, des parents connus pour leur rendement élevé et leur résistance à l'hiver. D'après les observations préliminaires faites en 1990, les familles diffèrent peu du point de vue de la vigueur, de la qualité et de la résistance à l'hiver. Les observations plus détaillées qui seront faites en 1991 permettront de déterminer les sujets dignes d'être placés dans des essais plus poussés axés sur la sélection ou le rendement. Un bon nombre de jeunes plants portent des gènes de la résistance aux pucerons et aux virus que ceux-ci transmettent — un fléau qui raccourcit la durée de vie des framboisières. **(UG)**

RASPBERRY YIELD TRIAL GUELPH

Cultivar	1988 Yield	1989 Yield	1990 Yield	Mean	Berry wt (g)
Boyne	4505	6554	6098	5719	2.0
Comet	2454	4430	5506	4130	2.5
Killarney	4747	7738	3922	5469	2.6
GU70	3176	4131	5956	4421	2.8
GU72	2849	7071	4876	4932	2.3
GU74	5755	6226	4936	5639	3.0
GU75	5298	8076	5920	6431	2.2
GU86	3848	6958	4772	5192	2.4

Three-year yield performance of red raspberry cultivars.

Rendement de performance sur trois ans des cultivars de framboise rouge.

Initial results of cooperative research between Guelph and HES, Simcoe which was begun in 1990, show that benzyladenine appears to be an effective fruit thinner and affects vegetative growth of apple trees. Work is continuing to determine if it is a suitable replacement for carbaryl (Sevin). **(UG)**

D'après les premiers résultats de la recherche faite en commun par Guelph et la SHE de Simcoe depuis 1990, la benzyladénine semble efficace comme éclaircisseur chimique des fruits et régulateur de la croissance végétative des pommiers. On poursuit les travaux pour déterminer si ce produit serait un substitut valable du carbaryl (Sevin). **(UG)**

Calcium sprays during the growing season have increased the firmness of McIntosh apples at harvest and throughout storage. **(HRIO)**

Des pulvérisations de calcium pendant la saison de végétation ont accru la fermeté des pommes McIntosh à la récolte et pendant tout le long de l'entreposage. **(IRHO)**

New techniques involving low oxygen atmospheres have been developed for controlling insect pests in stored apples. This new technology presents an 'environmentally friendly' alternative for maintaining pest-free apples without the use of traditional chemical fumigation methods. **(HRIO)**

On a élaboré de nouvelles techniques faisant appel à une atmosphère appauvrie en oxygène pour lutter contre les insectes ravageant les pommes entreposées. Ce nouveau procédé offre un moyen «écologique» de mettre les pommes à l'abri des insectes sans recourir aux méthodes traditionnelles de fumigation chimique. **(IRHO)**

Peach yields have been as good with a sod mulch system as with conventional cultivation and cover crop system with less exposure of the soil to erosion. **(HRIO)**

Des pêchers ont donné un aussi bon rendement sur un terrain engazonné qu'avec les façons culturales traditionnelles liées aux plantes de couverture, et le sol était moins exposé à l'érosion. **(IRHO)**

Peach clingstone selections that mature earlier than Veecling are showing good field and processing characteristics including resistance to bacterial spot disease which was severe in 1990. Earlier maturity will be beneficial to processors in lengthening the processing season. **(HRIO)**

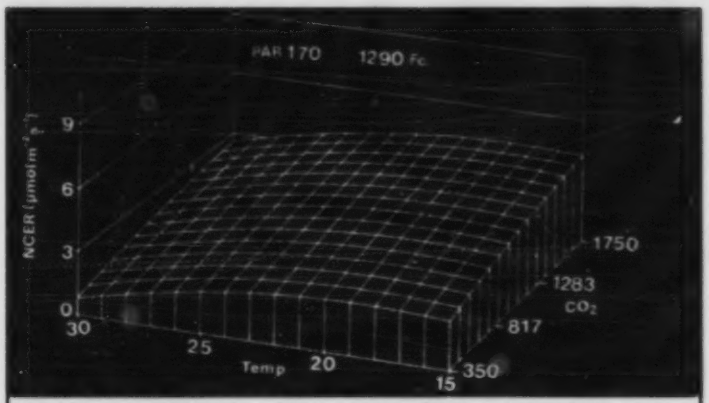
Des sélections de pêche à noyau adhérent, mûrissant plus tôt que la Veecling, présentent de bonnes caractéristiques du point de vue de la culture et de la transformation, notamment la résistance à la tache bactérienne qui a frappé sévèrement en 1990. Le mûrissement précoce sera bénéfique pour les conserveries qui pourront ainsi prolonger la saison de transformation. **(IRHO)**

New soil suitability ratings were developed for grapes in the Niagara Peninsula in conjunction with the Geographic Information System of the Ontario Institute of Pedology. **(HRIO)**

De nouvelles cotes d'aptitudes agronomiques des sols ont été élaborées pour la culture de la vigne dans la péninsule du Niagara, de concert avec le Système d'information géographique de l'Institut de pédologie de l'Ontario. **(IRHO)**

Strawberry plants from Ontario propagated for sale in Florida have been shown to be larger and fruit two weeks earlier than Florida-grown nursery plants, and are capable of higher yields. **(HRIO)**

On a constaté que des fraisiers de l'Ontario qui avaient été multipliés pour la vente en Floride se développent davantage et mûrissent deux semaines plus tôt que les plants obtenus dans les pépinières de cet État, et qu'ils sont en outre capables de donner de meilleurs rendements. **(IRHO)**



Whole plant growth model providing basis for greenhouse environment control.

Le modèle de croissance de la plante entière apporte un fondement au contrôle environnemental en serre.

Container grown plants fertilized with water soluble fertilizer were somewhat larger and of higher quality than those with slow release "complete" fertilizer. Pulse irrigation resulted in savings of nearly 10,000 litres of water per sprinkler and 7 hours less pumping time during an 11 week period. **(UG)**

La fertilisation des plantes en conteneurs, avec des engrais solubles dans l'eau, a entraîné une certaine amélioration de la qualité et de la croissance par rapport à l'engrais-retard «complet». L'irrigation intermittente a permis d'économiser près de 10 000 litres d'eau par asperseur et 7 heures de pompage au cours de 11 semaines. **(UG)**

Organic waste products including spent mushroom compost, composted municipal waste, and paper mill sludge have improved growth of container nursery stock. **(HRIO)**

L'apport de détritus de nature organique, tels que le vieux compost de champignon, les déchets municipaux compostés et les boues d'usine de pâte à papier, a stimulé la croissance en conteneurs de plants de pépinière. **(IRHO)**

Nutrient uptake of Samantha roses grown in rockwool seemed to follow plant development with the greatest demand at maximum leaf expansion when transpiration and thus water uptake is the greatest. Peak levels for nutrient uptake seemed to correspond to peaks in solar radiation. **(UG)**

L'absorption des éléments nutritifs par des roses Samantha cultivées dans de la laine de roche a semblé suivre la courbe du développement de la plante, la demande culminant au cours de l'expansion maximale des feuilles, quand la transpiration, et par conséquent l'absorption de l'eau, était à son plus haut niveau. Les pics d'absorption des éléments nutritifs correspondaient apparemment aux pics du rayonnement solaire. **(UG)**

Ornamental trees receiving trickle irrigation plus supplementary nitrogen grew more than non fertigated trees. **(HRIO)**

Les arbres ornementaux recevant une micro-irrigation enrichie d'azote se sont développés davantage que des arbres ni irrigués ni fertilisés. **(IRHO)**

Ornamental trees grown in in-ground fabric containers grew less and had lower leaf nutrient levels than trees without fabric containers. **(HRIO)**

Les arbres ornementaux cultivés en conteneurs de tissu placés dans le sol se sont moins développés, et leurs feuilles contenaient moins d'éléments nutritifs que des arbres sans conteneurs de tissu. **(IRHO)**

Sod farmers are now able to control annual bluegrass in Kentucky bluegrass sod with linuron, which research has proven to be an effective agent. **(UG)**

Les exploitants de gazonnières sont désormais en mesure d'enrayer le pâturin annuel dans le pâturin des prés grâce au linuron, dont l'efficacité a été démontrée par la recherche. **(UG)**

The economic potential of turfgrass seed production in Southern Ontario has been demonstrated for a number of fine turf species. **(UG)**

Le potentiel économique offert par la production de semences dans le sud de l'Ontario a été démontré pour un certain nombre d'espèces à gazon de qualité. **(UG)**

Pest Management

The focus of the pest management research is on the reduction of synthetic chemical pesticides in the environment through the development of integrated pest management programs that combine reduced pesticide application with genetic resistance, biological control, cultural practices, etc.

Environmental studies have documented the rapid disappearance of herbicides triclopyr, hexazinone, and 2-4-D in soil and aquatic environments. **(UG)**

Rates of herbicide combinations on sweet corn can be reduced by as much as 75% and still obtain acceptable weed control with no significant yield loss. Combined with banding, rates can be reduced as much as 87.5% and still obtain acceptable weed control with no yield loss. **(HRIO)**

Rye, fall-seeded into asparagus and killed with low rates of glyphosate prior to crop emergence, resulted in reduced soil erosion, improved weed control, and gave increased yields and superior quality asparagus. **(HRIO)**

San 582 HC (preplant incorporated) in combination with metribuzin is very promising for annual weed (including nightshade) control in tomatoes. **(RCAT)**

Research has shown that a farmer can eliminate the use of herbicides on barley by planting about the 25th of April and tolerating some weeds. The early planting date offers the farm operator the opportunity to apply herbicides only when needed. **(KCAT)**

Field studies on the development and control of the onion maggot in Ontario indicated that the two recommended insecticides, chlorpyrifos and fonofos continued to give effective control of first generation onion maggot as did an experimental insecticide, cyromazine. Fonofos, as applied as a seed treatment also showed potential. **(UG)**

A new insect of red clover seed is causing severe losses in Ontario. The pest is a casebearing larva of a small moth that infests the seed heads. Since there is no pesticide registered for this purpose, and spraying the blooming crop would destroy

Casebearing moth on red clover. Porte-case sur du trèfle des prés.

Lutte contre les maladies et les parasites

La recherche sur la lutte contre les ennemis des cultures met l'accent sur la réduction des pesticides chimiques synthétiques dans l'environnement. Elle repose sur l'élaboration de programmes de lutte intégrée contre les ennemis des cultures alliant l'application réduite de pesticides à la résistance génétique, aux contrôles biologiques, aux pratiques culturales, et aux problèmes spécifiques soulevés par les pesticides, etc.

Des études environnementales ont montré la disparition rapide des herbicides triclopyr, hexazinone et 2,4-D dans le sol et les milieux aquatiques. On a fait la démonstration des méthodes de désherbage dans les pratiques culturales de conservation. **(UG)**

On peut réduire de 75 % les doses combinées d'herbicides sur le maïs sucré et continuer à obtenir un désherbage acceptable sans perte appréciable de rendement. Lorsque les herbicides sont épandus en bandes, les doses peuvent même être réduites jusqu'à 87,5 % et assurer encore un désherbage acceptable sans perte appréciable de rendement. **(IRHO)**

En semant du seigle, à l'automne, dans une aspergeraie et en le détruisant par une faible dose de glyphosate avant que les tiges d'asperges sortent de terre, on a réduit l'érosion du sol, amélioré la lutte contre les mauvaises herbes et obtenu une récolte d'asperges supérieure en quantité et en qualité. **(IRHO)**

Le San 582 HC (incorporé avant la plantation), associé à la métribuzine, s'avère très prometteur pour enrayer les mauvaises herbes annuelles (notamment les morelles) dans les tomates. **(CTAR)**

La recherche a montré que l'agriculteur peut se dispenser de désherber chimiquement l'orge s'il la sème vers le 25 avril et s'il veut bien tolérer quelques mauvaises herbes. La précocité du semis offre à l'agriculteur la possibilité de n'appliquer des herbicides qu'au besoin. **(CTAK)**

Des études en milieu réel sur le développement de la mouche de l'oignon et les moyens de lutte en Ontario ont permis de constater que les deux insecticides recommandés, le chlorpyrifos et le fonofos, continuent d'enrayer efficacement la première génération de mouches de l'oignon comme l'a fait l'insecticide expérimental cyromazine. Le fonofos a également montré son efficacité pour le traitement des semences. **(UG)**

Un nouvel insecte qui s'attaque aux graines de trèfle rouge cause de lourdes pertes en Ontario. Il s'agit de la larve à fourreau d'une petite noctuelle qui infeste les tiges porte-graines. Comme il n'y a pas de pesticide homologué à

pollinators, the recommended control is to harvest all clover in infested areas as hay or silage to break the life cycle of this pest. **(UG/NLCAT)**

Biological control of mushroom fungus gnats with Bacillus thuringiensis or entomopathogenic nematodes has been successful. Methods of commercial application are being studied to reduce pesticide usage. **(HRIO)**

The use of a recently developed decision model will reduce unwarranted applications of soil fumigants to tomato fields. This model is based on critical counts of certain plant parasitic nematodes and of the soil-borne organism *Verticiltium dahliae*, and combination criteria. **(RCAT)**

A temperature-dependent model has been developed to predict the hatch of corn rootworm eggs and is accurate to within 1.5 days. This model will focus on controlling rootworms after they hatch on an 'as needed' basis. **(RCAT)**

A new method for applying corn rootworm insecticides is being developed using liquid insecticides injected into the soil after rootworm eggs have hatched. This will allow a reduced rate of application, and the implementation of a management program based on the monitoring of newly hatched larvae. **(RCAT)**

The use of the biological insecticide *Bacillus thuringiensis* to control European corn borer in sweet corn reduced the need for conventional insecticide by 66%. Less than 1% of the husked cobs were damaged by insects, a result equivalent to the best chemical insecticide. **(KCAT)**

Onion white rot does not spread from onion to onion in storage. Infections that develop in storage were initiated in the field prior to harvest. **(HRIO)**

Ginseng, the third most valuable horticultural crop grown in Ontario, is susceptible to Botrytis leaf blight, particularly if the foliage is injured by sand-blasting. Treatment with the fungicide iprodione and cultural procedures which limit sand-blasting help to alleviate the problem. **(HRIO)**

Preliminary work on Alternaria blight disease found that the maturity of fresh market tomato cultivars could be significantly increased by not using foliar fungicide sprays, without decreasing their yield. Processing cultivars also showed maturity increases, but about 50% of them showed yield declines in the absence of spray treatments. **(HRIO)**

Exposure of vegetable seedlings to ultralow levels of dinitroaniline compounds successfully induced resistance to fungal and bacterial wilt pathogens. This approach is new to

cette fin, et qu'un traitement de la luzerne en fleurs risque de détruire les insectes pollinisateurs, on recommande de faucher tout le trèfle situé dans les zones infestées pour en faire du foin ou de l'ensilage afin de rompre le cycle vital de ce ravageur. **(UG/CTANL)**

La lutte biologique contre les larves de la mouche des champignons à l'aide de Bacillus thuringiensis ou de nématodes entomopathogéniques a donné d'excellents résultats. On étudie actuellement des modes de traitement commerciaux afin de réduire l'usage des pesticides. **(IRHO)**

L'emploi d'un modèle de décision, récemment mis au point, permettra de ne fumiger le sol des champs de tomates qu'au besoin. Ce modèle est basé sur les seuils critiques des populations individuelles ou totales de certains nématodes phytoparasites et de l'organisme terricole *Verticillium dahliae*. **(CTAR)**

On a élaboré un modèle basé sur la température pour prédire à un jour et demi près l'éclosion des oeufs de la chrysomèle des racines du maïs. Ce modèle servira à régler, selon le moment, la lutte contre les larves écloses. **(CTAR)**

On met actuellement au point un nouveau moyen de lutte contre la chrysomèle des racines du maïs qui fait appel à l'injection d'insecticides liquides dans le sol après l'éclosion des oeufs de ce ravageur. On espère ainsi réduire les doses appliquées et mettre en oeuvre un programme de lutte basé sur le dépistage des larves nouvellement écloses. **(CTAR)**

L'emploi de l'insecticide biologique Bacillus thuringiensis contre la pyrale du maïs a permis de réduire de 66 % la nécessité d'utiliser un insecticide traditionnel dans la culture de maïs sucré. Moins de 1 % des épis dépanouillés étaient endommagés par les insectes, résultat aussi bon que celui du meilleur insecticide chimique. **(CTAK)**

La pourriture blanche de l'oignon ne se propage pas d'un oignon à l'autre pendant l'entreposage. Les infections qui apparaissent à ce stade ont pris naissance au champ, avant la récolte. **(IRHO)**

Le ginseng, au plan des recettes la troisième culture horticole en importance de l'Ontario, est sensible à la brûlure des feuilles Botrytis, en particulier si le feuillage est blessé par les particules de terre projetées par le vent. Le traitement au fongicide iprodione et les méthodes culturales qui réduisent les projections de poussière contribuent à atténuer le problème. **(IRHO)**

Des travaux préliminaires sur la brûlure alternarienne ont permis de découvrir que la maturité des cultivars de tomates destinées au marché frais accélérait nettement, sans que le rendement diminue, lorsque les plants ne reçoivent pas de fongicides foliaires. En l'absence de pulvérisations fongicides, on a également noté une accélération de la maturité chez les cultivars de conserverie, mais aussi une baisse de rendement chez environ 50 % d'entre eux. **(IRHO)**

En pulvérisant des composés de dinitroaniline à ultra-bas volume sur de jeunes plants de légumes, on est parvenu à induire leur résistance aux agents pathogènes responsables des

science. Dinitroaniline seed treatments were also effective. **(HRIO)**

The identification and elimination of cultural factors which promoted the occurrence of Green Mold Disease of garlic, has led to nearly perfect plant survival in commercial grower fields in Ontario. **(HRIO)**

Soil, Water And Air Research

The emphasis of OMAF's soil and water research efforts is on the prevention and mitigation of deterioration of these precious resources while maintaining productivity.

Research data suggest that as atmospheric carbon dioxide concentrations increase globally, corn plants will grow with a higher water use efficiency than at present. **(UG)**

The impact of weather on forage quality is of concern to farmers and agencies such as the crop insurance commission. It is apparent that very few leaves are broken from the stems by the impact of rainfall at intensities up to 40 mm per hour, but leaves are likely lost during handling of drying forage and may be lost at higher intensities of rainfall. Leaching of soluble dry matter caused measurable dry weight losses. Leaching of nutrients from drying forage increases with rainfall amount. **(UG)**

Laboratory results on soil erosion indicated that the transport capacities of very shallow overland flows under rainfall were about six times the transport capacities of equivalent flows without rainfall. **(UG)**

In work to study the concentrations of shallow groundwater (from tile drains and overland runoff), the nitrate concentrations observed in outflow from the buried-pipe drains has frequently exceeded the standard for drinking water of 10 mg/L. These high concentrations are not desirable as they are an index of nitrogen, a costly input, being lost from the root zone instead of being utilized in plant growth. Note, however, that nitrate leaving the system through outflow from the buried pipe drains reduces the threat of contamination of deeper groundwater. **(UG)**

An innovative and comprehensive approach to rate and evaluate the importance of agricultural lands throughout the province has been developed and tested. This programming model yields quantitative indicators of the degree to which agricultural lands in the province are critical to maintaining food production potential. **(UG)**

In work to assess the value of agricultural drainage for land capability ratings there are research results that can be used by government to determine which areas benefit most from subsidies for outlet drainage and which will be most profitable

flétrissures fongiques et bactériennes. Cette méthode est nouvelle en phytotechnie. Le traitement des semences à la dinitroaniline a également été efficace. **(IRHO)**

L'identification et l'élimination des facteurs culturaux qui favorisent l'apparition de la moisissure verte de l'ail ont abouti à une survie quasi parfaite des plantes chez les maraîchers de l'Ontario. **(IRHO)**

Le sol, l'eau et l'air

Dans ses projets de recherche sur le sol et l'eau, le MAAO a mis l'accent sur la prévention et la réduction de la détérioration de ces précieuses ressources tout en maintenant la productivité.

Des données expérimentales semblent indiquer qu'à mesure que les concentrations atmosphériques de gaz carbonique continueront d'augmenter à l'échelle du globe, les plants de maïs se développeront en valorisant l'eau mieux qu'actuellement. **(UG)**

L'incidence du climat sur la qualité des fourrages préoccupe les agriculteurs et les organismes tels que la Commission de l'assurance-récolte. Il s'avère que très peu de feuilles sont arrachées des tiges par l'impact des gouttes de pluie dont l'intensité va jusqu'à 40 mm à l'heure, mais les feuilles ont de fortes chances de tomber pendant la manutention du fourrage fané et aussi lorsque la pluie est plus intense. Le lessivage de la matière sèche soluble a entraîné des pertes de poids sec mesurables. Pendant le fanage, le lessivage des éléments nutritifs du fourrage augmente parallèlement à la quantité de pluie. **(UG)**

D'après les résultats de laboratoire concernant l'érosion du sol, les capacités de transport d'un filet d'eau ruisselant en surface sont environ six fois plus élevées par temps de pluie qu'en temps normal. **(UG)**

Dans les études sur les nappes d'eau situées à faible profondeur (alimentées par les tuyaux de drainage et le ruissellement de surface), les concentrations de nitrates observées dans l'eau évacuée par les tuyaux de drainage ont fréquemment dépassé la norme fixée pour l'eau potable, qui est de 10 mg/L. Ces concentrations élevées sont déplorables car elles signifient que l'azote, un facteur de production qui coûte cher, est évacué loin de la rhizosphère au lieu de profiter à la croissance des plantes. À noter cependant que l'évacuation du nitrate par les canalisations enterrées réduit la menace de contamination des nappes phréatiques situées à plus grande profondeur. **(UG)**

On a élaboré et mis à l'essai une méthode novatrice et complète pour classer et évaluer l'importance des terres agricoles dans toute la province. Ce modèle de programmation fournit des indicateurs quantitatifs du rôle plus ou moins critique que les terres agricoles de la province jouent dans le maintien du potentiel de production alimentaire. **(UG)**

L'évaluation du drainage agricole des sols ayant des cotes d'aptitudes culturales différentes a fourni des données permettant au gouvernement de déterminer quelles zones bénéficient le plus des subventions pour le drainage par collecteurs, et lesquelles

to farmers when one considers subsurface drainage on various soil texture types and under various soil drainage conditions. **(UG)**

A new test for nitrogen has been developed which takes into account site-specific variations in the residual content of inorganic nitrogen. This test will provide Ontario farmers with a powerful new tool to assist in predicting nitrogen requirements for corn. It should also increase profitability, and at the same time lessen the possibility of nitrate contamination of the groundwater. **(UG)**

Starchy waste material from the potato industry can be spread on agricultural land without harmful effects, but it will not improve the soil structure or increase yields. **(UG)**

Riser inlets have become integral components of erosion control and water management systems. They are used to cycle surface water directly to subsurface drains. Significant base line information for the design of these systems has been developed and is available from agricultural extension engineers, drainage engineers, and drainage contractors. **(UG)**

White rectangles are compacted plots and dark rectangles are non-compacted plots.

Les rectangles blancs représentent les périmètres compactés et les rectangles foncés sont les périmètres non compactés.

Although alfalfa was found to decompact fine textured soil structure, winterkill was excessive, requiring replanting in the spring of 1990. For sustained long term production, shaping the land into crowns or raised beds was necessary. French drains between the crowns functioned more efficiently than ditches. A guideline will soon be published on the construction and maintenance of crowned fields. **(ACAFT).**

Summer cover crops of sorghum-sudan grass or oil-seed radish reduced the soluble salt content in muck soils by 70% one season, compared to conventional cropping which reduced soluble salts by 36%. **(HRIO)**

The first tomato yields following eight different crops were harvested in 1990 at two locations. Continuous tomatoes had slower and less growth than tomatoes following other crops and yielded the lowest at both locations. **(RCAT)**

Continuous processing tomato yields were not increased significantly by nine different cover crops planted following tomato harvest. Tomato harvests tended to be higher following

seront les plus profitables pour les agriculteurs lorsqu'on considère le drainage souterrain dans les divers types de texture du sol et dans les diverses conditions de drainage du sol. **(UG)**

On a élaboré un nouveau procédé d'analyse de l'azote qui tient compte des variations, spécifiques au milieu, de la teneur résiduelle en azote inorganique. Grâce à ce procédé, les agriculteurs de l'Ontario disposeront d'un nouvel outil puissant pour tenter de prédire les besoins du maïs en azote. Ce procédé devrait également contribuer à accroître la rentabilité et, du même coup, diminuer le risque de contamination des nappes souterraines par les nitrates. **(UG)**

Les déchets féculents des usines de pommes de terre peuvent être épandus sur des terres agricoles sans dommages, mais ni la structure du sol ni les rendements ne s'en trouveront améliorés. **(UG)**

Les puisards surélevés font désormais partie intégrante des systèmes de lutte contre l'érosion et de gestion de l'eau. Ils servent à acheminer l'eau de surface directement dans les drains enterrés. L'importante information de base permettant la conception de tels systèmes est maintenant rassemblée; on peut l'obtenir auprès des ingénieurs-vulgarisateurs du génie rural ainsi que des spécialistes du drainage et des entreprises de drainage. **(UG)**

Bien que la culture de la luzerne ait eu pour effet de décompacter les sols à texture fine, cette culture a été excessivement détruite pendant l'hiver et a dû être resemée au printemps de 1990. Pour s'assurer d'une production durable, il a été nécessaire de modeler le champ en planches bombées ou en billons. Les fossés couverts situés entre les planches ont évacué l'eau plus efficacement que les fossés ouverts. Des lignes directrices sur le modelage et l'entretien des planches bombées seront bientôt publiées. **(CTAAA)**

Lorsqu'employés comme plante de couverture d'été, le radis oléagineux ou les sorghos, dont l'herbe du Soudan, ont réduit de 70 % en une saison la teneur en sel soluble des sols organiques, comparativement à la réduction de 36 % réalisée avec les pratiques culturales traditionnelles. **(IRHO)**

En deux endroits en 1990, on a récolté des tomates cultivées à la suite de huit différentes cultures. Les tomates cultivées continuellement sur la même terre croissaient moins bien et plus lentement que les tomates succédant à d'autres cultures, et leur rendement a été inférieur aux deux endroits. **(CTAR)**

Les rendements de tomates de conservation, cultivées continuellement sur la même sole, n'ont pas été nettement améliorés par les neuf différentes plantes de couvertures semées

those cover crops with the most biomass. There was considerably less replanting on those plots with sufficient residue to protect the soil. **(RCAT)**

Nineteen trials were conducted on soils ranging from loamy sand to clay in southwestern Ontario. It was generally found that the O.M.A.F. soil test provided sufficient, and in many cases, more than sufficient phosphate and potash for maximum economic yields of soybeans. **(RCAT)**

Results of an agroforestry study indicate high mortality for nursery stock in untilled soil. Intercropping trials, currently entering their third growing season continue to exhibit accelerated growth. Windbreak maintenance studies involving moving, cultivating, pruning and thinning practices are showing signs of accelerated growth when compared with neglected windbreaks. **(RCAT)**

Economics

The OMAF research program in economics is concerned with the international picture as well as with individual farm management and financial practices.

Various risk management strategies and tools have been examined for use in agriculture, including futures and options, land leases, and different GRIP safety net proposals. Research results show that, with GRIP and NISA in place, farmers will take on more risky ventures than without the policies, cash rents and land values will likely increase, and farmers will be able to take on increased amounts of debt (due to risk reduction and increased incomes). **(UG)**

Operating a beef cattle breeding herd on Class I-III land in southwestern Ontario can be profitable, but depends primarily on three principal aspects. Pastures must be intensively managed and the grazing carefully controlled. High rates of livestock productivity must be obtained through superior calving and by marketing the progeny as feeders or finished rather than as weaned calves. Capital costs of beef housing, feeding and manure-handling facilities also must be kept as low as possible. **(UG)**

The value of farm labour has been identified as making an important contribution to changes in farm structure. Up to 75% of the change in average farm size in the Ontario dairy industry between 1961 and 1985 can be explained by changes in the value of farm labour relative to the cost of capital. These results suggest that farm size may, in fact, be determined in part by factors

après la récolte des fruits. La récolte était en général meilleure derrière les cultures de couverture laissant le plus de biomasse. Il a fallu resemer beaucoup moins sur les parcelles où il y avait suffisamment de résidus pour protéger le sol. **(CTAR)**

Dix-neuf essais ont été effectués dans le sud-ouest de l'Ontario sur des sols variés allant du sable loameux à l'argile. En général, selon l'analyse de sol du MAAO, les sols contenaient suffisamment — et dans de nombreux cas plus que suffisamment — de phosphate et de potasse pour permettre des rendements économiques optimaux de soya. **(CTAR)**

Une étude agroforestière a permis de constater une mortalité élevée des plants de pépinière replantés dans une terre non travaillée. Dans certains essais avec cultures intercalaires, lesquelles sont actuellement dans leur troisième saison de végétation, les plants continuent d'afficher une croissance accélérée. Il ressort des études sur l'entretien des brise-vent que le fauchage, le travail du sol, l'élagage et l'éclaircissement des arbres favorisent une croissance accélérée comparativement aux brise-vent laissés à eux-mêmes. **(CTAR)**

Recherche en économie

Le programme de recherche du MAAO en économie rurale s'intéresse à l'aspect international aussi bien qu'à la gestion des entreprises agricoles individuelles et à leurs pratiques financières.

On s'est penché sur l'emploi de diverses stratégies et outils de gestion du risque, notamment les marchés à terme et les options, les locations de terres et différentes formules de protection du revenu proposées dans le cadre du RARB. Les recherches montrent qu'avec l'entrée en vigueur du RARB et du CSRN les agriculteurs se lanceront dans des productions plus risquées qu'auparavant, que les fermages et les valeurs des terres vont certainement augmenter et que les agriculteurs seront capables d'assumer des montants accrus de dettes (grâce à la réduction du risque et à l'augmentation du revenu). **(UG)**

L'exploitation d'un troupeau reproducteur de bovins de boucherie sur des terres de classes I, II et III peut être rentable dans le sud-ouest de l'Ontario, mais elle dépend largement de trois grands facteurs. Il faut gérer intensivement les pâturages et planifier soigneusement la paissance. L'entreprise bovine ne connaîtra une productivité élevée que si le croît du troupeau est supérieur et que les animaux sont vendus en tant que veaux d'engrais ou bovins gras et non de veaux sevrés. Il faut maintenir aussi bas que possible les investissements dans le logement des animaux et les installations de manutention des aliments et du fumier. **(UG)**

On s'est aperçu que le coût de la main-d'oeuvre agricole a fortement contribué à l'évolution de la structure des entreprises. En Ontario, l'évolution de la taille moyenne des entreprises laitières entre 1961 et 1985 peut s'expliquer jusqu'à 75 % par les changements survenus dans le coût de la main-d'oeuvre par rapport au coût en capital. Ces résultats donnent à penser que la

outside of agriculture such as availability and wages of labour. **(UG)**

taille des entreprises peut, en fait, être partiellement tributaire de facteurs exogènes tel que l'offre de main-d'oeuvre et les salaires. **(UG)**

Conventional tillage practices were found to be more profitable than conservation tillage practices, but tended to create substantially more damage through eroded sediment to streams, rivers and lakes. These results suggest a need for more serious consideration of policy instruments intended to deal with soil erosion as a pollution problem rather than as a productivity problem. **(UG)**

On a constaté que les pratiques traditionnelles de travail du sol étaient plus profitables que les pratiques culturales de conservation, mais qu'elles entraînaient souvent beaucoup plus de dommages à cause des sédiments érodés qui se retrouvent dans les cours d'eaux, les rivières et les lacs. Ces résultats montrent qu'il est nécessaire de réfléchir plus sérieusement à des instruments politiques qui permettraient de s'attaquer au problème de l'érosion comme à un problème de pollution et non de productivité. **(UG)**

Those shoulders, slopes, and knolls that have suffered erosion from past intensive tillage and cropping practices need special treatment to bring them back to life and to begin to make them pay. Research results to date suggest that long-term pasturing, in combination with manures, and long-term tree-cover crops are the most promising. **(UG)**

Il faudra accorder un traitement spécial aux talus, aux coteaux et aux buttes qui ont souffert de l'érosion causée naguère par des pratiques culturales intensives, si on veut les remettre en état et en production. Il ressort des recherches menées jusqu'ici que le meilleur espoir réside dans le pâturage à long terme associé à l'apport de fumier et à l'implantation à long terme d'arbres de couverture. **(UG)**

Survey results indicate that repeat buyers for premium-priced aged steak were attracted by the leanness, healthiness and overall quality of the product with respect to its palatability, tenderness, and taste. **(UG)**

Les résultats des sondages indiquent que les consommateurs qui ont acheté plusieurs fois du steak rassis à point et l'ont payé plus cher que le steak normal appréciaient sa forte teneur en maigre, sa qualité diététique et sa qualité générale du point de vue de l'appétabilité, de la tendreté et du goût. **(UG)**

'Excellent' hog producers were found to have five common characteristics: (i) they all had family help getting started; (ii) they searched for information about their industry from many different sources; (iii) they used proven rather than 'state-of-the-art' technology; (iv) they thought that tile drainage had contributed more to their success than had any other factor; and (v) they had good 'farm skills', e.g. they did their own routine equipment repair and maintenance herd health. **(UG)**

Les «excellents» éleveurs de porc présentent tous les cinq caractéristiques suivantes : (i) ils ont débuté avec l'aide de la famille; (ii) ils se sont renseignés sur la production porcine auprès de sources diverses; (iii) ils ont utilisé des techniques éprouvées et non celles «de pointe»; (iv) ils pensent que le drainage par canalisations enterrées a contribué à leur réussite plus que tout autre facteur; (v) ils sont habiles et bricoleurs, c.-à-d., ils réparent eux-mêmes le matériel et assurent les soins de santé du troupeau. **(UG)**

The major problem faced by most Ontario swine farmers is still the inability to recruit sufficient numbers of labourers despite a gloomy economy. Although availability has improved compared to a year ago, uncompetitive working conditions, poor wage ratio, and lack of standard labour policies are blamed for the low recruit numbers. **(RCAT)**

Le principal problème rencontré par la plupart des éleveurs de porcs ontariens demeure l'impossibilité d'embaucher des nombres suffisants de porchers malgré le triste état de l'économie. Bien que l'offre de main-d'oeuvre se soit améliorée comparativement à il y a un an, on impute la rareté des candidats aux conditions de travail peu attrayantes, à la modicité des salaires et à l'absence de politiques de travail uniformisées. **(CTAR)**

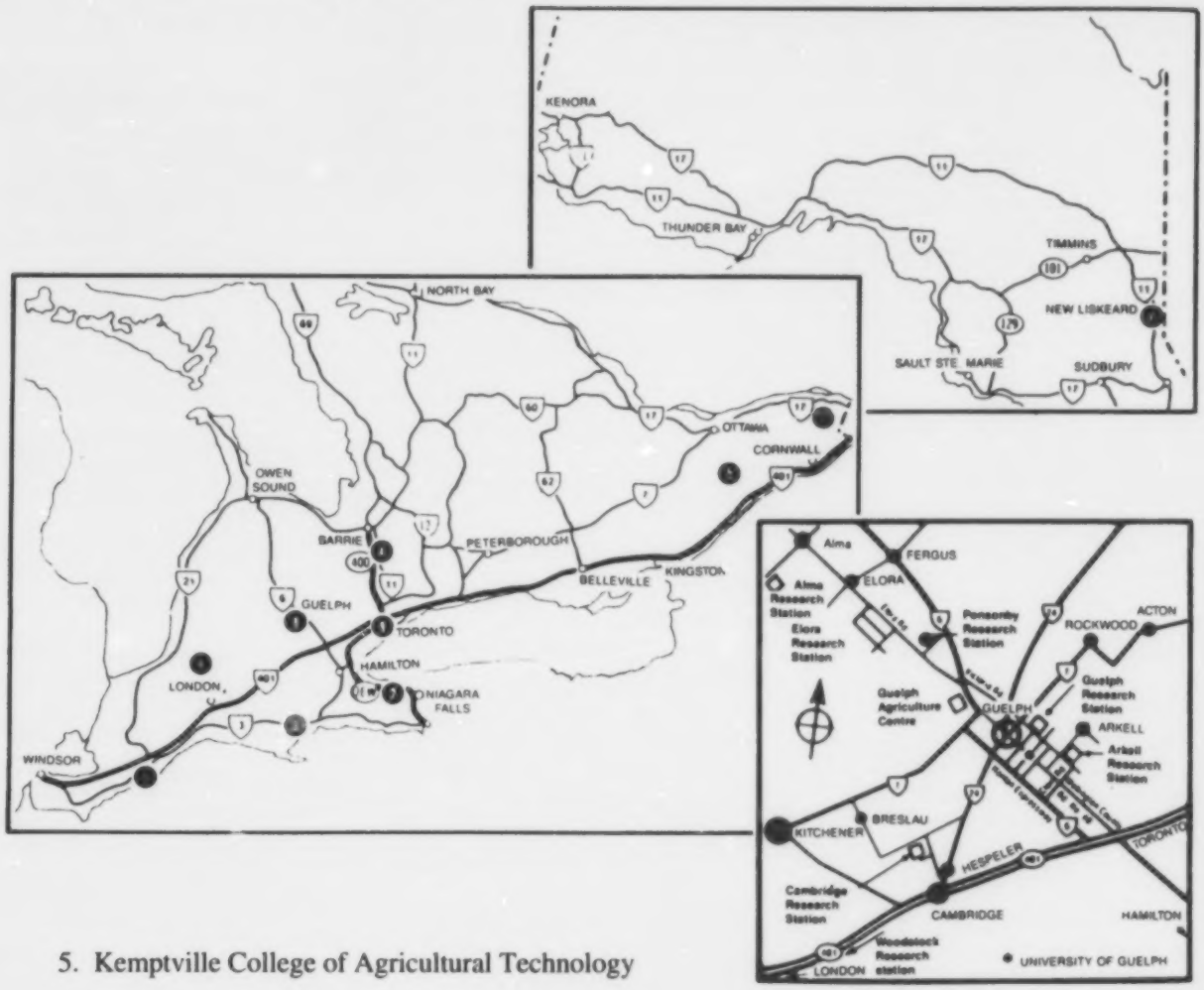
Seasonal patterns of Ontario cash corn prices have changed dramatically since Ontario achieved self-sufficiency in corn usage (roughly 1975-76). Now short term storage does not pay off as it once did. Prices also peak earlier (June vs.August). The countervail has had no effect on this price cycle pattern. **(RCAT)**

La courbe des variations saisonnières des prix du maïs-grain a nettement changé depuis que l'Ontario produit suffisamment de maïs pour ses besoins (vers 1975-1976). Aujourd'hui, entreposer son maïs durant quelques mois ne rapporte plus autant qu'auparavant. Les prix atteignent également leur point culminant plus tôt (juin au lieu d'août). Le droit compensatoire n'a pas eu d'effet sur cette courbe des prix. **(CTAR)**

Inventory of Agricultural Research Projects

The inventory of agricultural research projects contains all projects that were active during the fiscal year 1990-91. All those listed were funded completely or in part by the Ontario Ministry of Agriculture and Food. Those at the University of Guelph are carried out under an agreement with the Ministry.

1. Centralia College of Agricultural Technology
2. Horticultural Research Institute of Ontario, Vineland Station
3. Horticultural Experiment Station, Simcoe
4. Muck Research Station, Bradford



5. Kemptville College of Agricultural Technology
6. New Liskeard College of Agricultural Technology
7. Ridgetown College of Agricultural Technology
8. University of Guelph, and Agricultural and Food Laboratory Services (OMAF)
9. Policy and Programs Division (OMAF, Toronto)
10. Alfred College of Agriculture and Food Technology

AGRICULTURAL ENGINEERING SERVICES

Located in twelve offices across the province, staff of the Engineering Resources Unit within the Resources Management Branch are involved in a variety of applied and on farm projects to evaluate and demonstrate new technology. Research results often require refinement and adaptation to fit existing systems before the technologies can be utilized on the farm. By monitoring and interpreting these projects, engineers are able to implement new information more rapidly into the hands of the appropriate stakeholders in the agriculture and food sector.

Project Title	Researcher
Control strategy for sidewall and ridge openings of cold, modified and warm dairy housing	Choinière, Munroe, Suchorski-Tremblay
Computer aided design software of natural ventilation for livestock housing and single arch greenhouse	Choinière, Munroe, Suchorski-Tremblay, Tremblay
Wind tunnel studies on natural ventilation of livestock buildings	Choinière , Munroe Suchorski-Tremblay, Tremblay
Demonstration table top display of forced air cooling options for tender fruit	Fraser
Forced air cooling of peaches in bins	Fraser
Niagara tender fruit receiving station cooling capacity survey	Fraser
Redesign of strawberry master for more efficient forced air cooling	Fraser

Project Title	Researcher
Thermal behaviour of polyurethane foam insulation when subjected to high thermally induced vapour pressure gradients and freeze/thaw cycling	Fraser
Niagara peach cooling/warming study	Fraser, Cobbledick
Development of a heavy trash manure injection system for Ontario conditions	Hilborn
Development of guidelines for small diameter tile drainage systems	Hilborn
Development of radio controlled shutoff systems for directly connected manure application systems	Hilborn
Improvement of water and sediment control basin computer design program	Hilborn
Agricultural information manager, computer program	Toombs

AGRICULTURAL AND FOOD LABORATORY SERVICES

The Provincial Pesticide Residue Testing Laboratory is one of four sections of Agricultural and Food Laboratory Services Branch. The research objectives are to improve and amend pesticide registrations and recommendations in order to reduce residues below the negligible level of 0.1 mg/ kg wherever possible. The physical dispersal, chemical breakdown, and microbiological degradation of pesticides and toxic metabolites are monitored to set pre-harvest intervals for application of the chemicals. This research adds to our general understanding of the fate of pesticides in the environment and food.

Studies on the hazards of re-entry into treated areas help minimize the risks in using pesticides. This research includes monitoring the exposure, absorption, and excretion of pesticides on those who use them and studying the effect of laundering clothing to help minimize the risk of applying these chemicals. Studies on culinary practices and cooking are being conducted to determine what residues can be removed or reduced by these means.

Monitoring studies are also conducted on fruits, vegetables, soil, tobacco, water and domestic and wild birds, animals and fish to examine trends in pesticides and other anthropogenic chemical contaminants.

Project Title	Researcher
Livestock	
Translocation of topically applied synthetic insecticide on bovine	Surgeoner, Ripley, Burchat

Project Title	Researcher
Engineering	
Mycotoxin residues in corn	Ewing, Schaafsma
Congener specific PCB analysis Immunoassay evaluation	Rasper, Ripley, Clegg, Hall, Burchat, Ripley
Analytical method and development for new fungicides, insecticides and herbicides	Ripley, Clegg, Burchat

Project Title	Researcher
Modelling pesticide dissipation	Ripley, Clegg, Ritcey, Burchat
Monitoring flue-cured tobacco and soils on 34 farms for pesticide residues and metal contents	Ripley, Burchat, Clegg, Zilkey
Rinsing of sprayers	Ripley, Clegg
Integrated weed management in white beans	Swanton, Clegg

Food And Food Quality

Monitoring sulfa residues in pork	Chapman, Ripley
Method development for drugs including sulfathiazole and other drugs	Chapman, Burchat Ripley, Clegg
Sources of PCP in animal tissues	Frank, Clegg, Butler
Monitoring Ontario-grown fruit and vegetables for pesticide residues	Ripley, Burchat
Iodine levels in milk	Ripley, Chapman
Disappearance of pesticides from grapes made into wine	Ripley, Clegg
Monitoring animal tissues for pesticide residues and metals	Ripley, Luyken
EBDC residues in lettuce	Ripley, Ritcey, Burchat
Researching residue behaviour in raw and processed fruit and vegetables	Ripley,Ritcey, Burchat,

Horticultural Crops

Dissipation of herbicide residues from onions and organic soils	Clegg, Ritcey
Fungicides for protection of carrots against storage rots	Ripley, McDonald
Dissipation of fungicide residues from minor crops	Ripley, Ritcey, Burchat
Dissipation of insecticide residues from minor crops	Ripley, McEwen, Ritcey, Harris
Dissipation of pyrethroids from muck crops	Ripley, McEwen, Ritcey, McDonald
Studies on pesticides for minor crop registration	Ripley, Clegg, Burchat Ritcey, Harris

Human Exposure

Reducing applicator exposure to herbicides	Clegg
Following the changes in organochlorine residues in Ontario residents	Rasper, Ripley
Monitoring and reducing IPM scout exposure	Ripley, Burchat
Reducing residues through culinary practices	Ripley, Ritcey, Burchat
Re-entry into treated crops	Ripley, Ritcey, Clegg, Burchat

Soil, Water, And Waste Management

Stability of pesticides in water	Clegg, Ripley
Metolachlor dissipation in the field	Clegg, Frank, Patni
Monitoring shallow and deep wells for pesticides and anions	Ripley, Chapman, Clegg
Monitoring surface water for pesticides and anions	Ripley, Chapman, Clegg
Monitoring sludge amended soil for heavy metals	Soda, Ripley

ALFRED COLLEGE OF AGRICULTURE AND FOOD TECHNOLOGY / COLLEGE DE TECHNOLOGIE AGRICOLE ET ALIMENTAIRE D'ALFRED

Alfred College is located 65 km east of Ottawa on the Trans-Canada Highway, #17. It is in the heart of the highest concentration of francophones in the Province and French is the language of administration and teaching at the College. It is also in one of the main milk-producing regions of Ontario where soils for the most part are of very productive clays; by their nature, however, they are poorly drained.

Research began at the ACAFT in 1983 with a project to resolve drainage problems in this clay soil. In the fall of 1985, another was begun to evaluate the use of mole drains in combination with 'French' drains. This research has been quite successful and further work is underway.

The College has crop demonstration plots, begun in 1984, and a maple bush in which demonstrations are given. The land base is 150 Hectares.

Project Title	Researcher
Alfalfa yield performance with improved surface and subsurface drainage of fine textured soils	Naiho-Jina, Weil, Chambers
Improving the degraded structure of fine textured soils with deep tillage and legume crops	Chambers, Naiho-Jina, Weil, Culley

Project Title	Researcher
Milkhouse effluent treatment	Weil, Gagnon

CENTRALIA COLLEGE OF AGRICULTURAL TECHNOLOGY

Centralia College is in the heart of Western Ontario's diverse agricultural region. In agronomy, researchers test new practices in production, such as different row widths and planting dates and the use of crop rotations and plow-down legumes, for white and coloured beans, soybeans for human and animal consumption, canola and rutabagas. New varieties are tested for traits such as their yield potential and pesticide screening trials are held. These data are used in selecting varieties and pesticides for registration and are the basis for Ministry production recommendations. Development continues at the new Agronomy Research Farm and the Agronomy laboratory has recently been completed.

Project Title	Researcher
Food Science	
Alternate coloured bean products	Currie
Utilization of white pea bean	Currie
Agronomy	
Pest control in rutabagas	Brolley
Processing vegetable production and management	Brolley
Rutabaga production and management	Brolley
Weed control in sweet corn	Brolley
Canola variety testing and management	Forrest
Cold tolerance during reproductive growth in soybeans	Forrest

Project Title	Researcher
Cultivar improvement in yellow eye bean	Forrest
Disease control in dry edible beans	Forrest
Dry edible bean variety testing and management	Forrest
Evaluation of management systems utilizing red clover as a plowdown crop	Forrest
Lupin fertility requirements	Forrest
Lupin variety testing and management	Forrest
Soybean variety testing	Forrest
Corn variety trials	O'Toole
Insect control in white beans	O'Toole
Weed control in corn	O'Toole
Weed control in field beans	O'Tooe

POLICY AND PROGRAMS DIVISION

The Division provides leadership in agriculture and food policy through excellence in information, analysis, advice and coordination. This mission will be fulfilled through effective management of human resources, effective communications, best possible information base, leadership in policy and programs, and strategic planning of future direction.

The Division was developed from the former Economics and Policy Coordination Branch and is composed of the Policy Analysis Branch and the Policy and Program Coordination Branch.

The Policy Analysis Branch serves the Minister, the Deputy Minister, other Divisions/ Branches, other Ministers/ Agencies, other governments, the agriculture and food industry and the public. The Branch assesses the economic implications of different agricultural and food policy choices, and by assembling and interpreting agricultural economic information. The Branch conducts research into farm costs and business management, marketing methods and agricultural policy. It also gathers and publishes a wide range of agricultural statistics, and monitors economic developments in the food processing, distributing and retailing sectors.

The Branch also provides daily farm market broadcasts for the media and producers. From the Ridgetown office, field staff carry on economic research projects and provide consulting services to farm organizations, individual farmers and processing industries.

The Policy and Program Coordination Branch expedites the legislative process of the Ministry. It focuses on policy and program development, gives guidance and policy coordination to the Ministry, government and industry.

The Branch is also responsible for research, analysis and service delivery in federal-provincial relations, strategic planning and program evaluation.

Project Title	Researcher
Survey of custom farmwork rates	Burgess
Livestock cost of production report	Fisher
Cost of inputs in Canada and U.S.	Hope, Boyd
Apple, peach and grape: estimated establishment costs	McKibbon
Fruit crops: estimated production costs	McKibbon
Vegetable crops: estimated production costs	McKibbon
Rural real estate prices in Ontario	Rankin, Bohl, Lentz

HORTICULTURAL RESEARCH INSTITUTE OF ONTARIO

HRIO is situated in the midst of Ontario's, and indeed Canada's prime horticultural region. It is made up of four units: the Horticultural Experiment Station and Horticultural Products Laboratory at headquarters in Vineland Station, the Horticultural Experiment Station at Simcoe close to Lake Erie, and the Muck Research Station at Bradford in the Holland Marsh north of Toronto. Each unit has a specialized function, but the overall objective of the programs is to develop crops and varieties which will help make Ontario more self-sufficient in these types of food, storage and processing technologies which will extend the market life of domestically grown produce, and mechanized crop management and energy conservation for efficient production.

At the Horticultural Experiment Station, Vineland, attention is focused on protected food crops, tender and small fruits, tree fruits, edible fungi, ornamentals and cut flowers, and plant nutrition for a variety of species. Including a grape sub-station, the land base is 90 hectares.

Researchers at the Horticultural Products Laboratory, Vineland, investigate storage handling, processing, and quality of harvested fruits, vegetables and ornamentals. The evaluation of cultivars from HRIO'S breeding program and of those from other regions is a very important part of their work. The Laboratory is increasingly concerned, as well, with the development of further-processed, added value products.

The Horticultural Experiment Station, Simcoe, concentrates its efforts one-third on fruit and two-thirds on vegetables, a reflection of the commercial production in that area. Fruit research includes extensive work on apples as well as on berry fruits such as strawberries, highbush blueberries, raspberries, currants, and the recently introduced tayberry from Scotland. Vegetable research emphasizes the mechanical harvesting of processing crops, particularly tomatoes and cucumbers, field tomato breeding, and the epidemiology and control of diseases.

At the three-hectare Muck Research Station, research is focused on crops grown in the organic soils of the ancient lake bottom: chiefly onions, carrots, lettuce and celery. Cooperative studies are carried out with HPL on storage of these vegetables, and with the University of Guelph and Agriculture Canada on controls for various pests and diseases.

Horticultural Crops

Project Title	Researcher
Fruit	
Evaluation and development of analytical methods for determining the nutrient status of plant material	Cline
Fertilizer and soil management studies with apple	Cline
Studies of the use of paper mill sludge	Cline
Fertilizer and soil management studies with grapes	Cline, Fisher
Soil management and fertilizer studies with Peach	Cline, Miles
Trickle irrigation studies for horticultural crops	Cline, Miles, Tehrani, Fisher
Coordinated small fruit trials in Ontario	Dale
Development of improved strawberry cultivars for fresh market and processing	Dale
Evaluation of wild *Fragaria virginiana* clones for useful characteristics for cultivar breeding	Dale
Management of small fruit crops	Dale
Alternative thinning materials for apples	Elfving
Apple cultivar evaluation	Elfving
Apple rootstock evaluation	Elfving
Effect of growth regulators on apple chemical thinning	Elfving
Effect of nitrogen fertilization on dwarf apple trees	Elfving
Effect of plant growth regulators on apple	Elfving
Irrigation of size-controlled apple trees	Elfving
Orchard factors influencing apple fruit quality	Elfving
Apricot breeding and cultivar evaluation	Fisher
Breeding for wine grapes adapted to Ontario conditions	Fisher
Freezing tests for cultivar/clonal rootstock evaluation and management	Fisher
Grape breeding for dessert cultivars adapted to Ontario climatic conditions	Fisher
Grape rootstock for vinifera cultivars	Fisher
Grape rootstocks - scion/rootstock combinations for non-vinifera cultivars	Fisher
Grapevine population studies in relation to yield and quality	Fisher
Growth regulators in the vineyard	Fisher
Training systems for grape cultivars	Fisher
Vinifera cultivar and training combination trial	Fisher
Vinifera growers' survey Fisher Rapid propagation of Sovereign Coronation grapevines	Fisher
Soil management irrigation and summer pruning interaction on Riesling/3309 grapevines	Fisher, Cline
Leaf removal of vinifera grapes to reduce Botrytis bunch rot and to improve quality	Fisher, Guttler
Breeding field resistance of peaches to canker disease	Miles
Control of Cytospora Canker Disease in Peach	Miles
Evaluation of prunus rootstock for peach	Miles
Peach and nectarine cultivar evaluation	Miles
Peach cultivar evaluation for canker resistance	Miles
Propagation methods for peach trees	Miles, Chong
Trellised peach orchard studies	Miles, Cline
Breeding clingstone peaches	Miles, Wang
Breeding for early maturing European and Japanese plums and pollen compatibility studies with plums	Tehrani
Breeding for a seasonal succession of firm-fleshed non-cracking self-fruitful black sweet cherry cultivars and determination of incompatibility group of selections	Tehrani
Breeding sour cherry cultivars superior to Montmorency	Tehrani
Comparison of productivity and growth of the late maturing advanced European plum selections and cultivars	Tehrani
Evaluation of Bosc with seven quince dwarfing rootstocks	Tehrani
Evaluation of eight size-controlling quince rootstocks with compatible bartletts	Tehrani
Growth and productivity of Japanese plum cultivars on different rootstocks	Tehrani
Influence of different selections of prunus mahaleb rootstock on productivity and growth to two tart cherry cultivars	Tehrani
Influence of colt, mahaleb and mazzard rootstocks on the performance of montmorency and meteor tart cherries	Tehrani
Influence of colt, MXM14, P. mahaleb and P. mazzard rootstocks on productivity and growth of sweet and tart cherry cultivars	Tehrani
Influence of rootstock on performance of advanced self-fruitful selections and standard sweet cherry cultivars	Tehrani

Project Title	Researcher
Influence of rootstock productivity and growth of European plum cultivars and early blue Vineland selections	Tehrani
Management studies with Bartlett pear on quince rootstock	Tehrani
Performance of Anjou, Bartlett and Bosc pear on standard and Old Home X Farmingdale clonal rootstocks	Tehrani
Spacing trial with Bartlett pear on standard rootstock	Tehrani
NC-140 cooperative sweet and tart cherry rootstock trials	Tehrani
NC-140 cooperative pear rootstock trial	Tehrani
Regional European plum cultivar and rootstock planting	Tehrani
Regional pear rootstock and cultivar trials	Tehrani
Rootstock and training study with Anjou, Bartlett and Flemish Beauty pear cultivars on three quince rootstocks	Tehrani
Rootstock studies with Anjou, Bartlett, Bosc and Flemish Beauty cultivars on quince A and C	Tehrani
Effects of post-harvest refrigeration and drying air temperature on ginseng root quality	VanHooren

Vegetables and Edible Fungi

Asparagus production and management	Baker
Cole crop production and management	Baker
Garlic production and physiology	Baker
New crop development	Baker
Field tomato breeding	Brammall
Fresh market varieties of tomato for the fast food industry	Brammall
Greenhouse tomato breeding	Brammall
Tomato breeding: Fresh market varieties for the Fast Food Industry	Brammall
Evaluation of vegetable seed coatings and seed enhancements	McDonald
Herbicide trials and wind abatement for muck vegetables	McDonald
Management of muck soils	McDonald
Muck vegetable crop projection trials	McDonald
Muck vegetable cultivar evaluations	McDonald
Onion, carrot and celery storage trials	McDonald
Pesticide residue monitoring of muck vegetables	McDonald

Project Title	Researcher
Cover cropping strategy for first early potato production	McKeown
Potato management and physiology	McKeown
Seed potato management and physiology	McKeown
Sweet potato production and management	McKeown
Tomato management and physiology	McKeown
Influence of cultivars and other factors of production on yield and quality of peppers	O'Sullivan
Production practices for vine crops	O'Sullivan
Biological control of mushroom fungus gnat	Rinker
Mushroom compost - substrate preparation and formulation	Rinker
Mushroom crop management - casing soil studies	Rinker
Mushroom crop management - response to supplementation	Rinker
Mushroom pest management - evaluation of pesticides	Rinker
Production of alternate fungi	Rinker
Greenhouse tomato crop management	Straver
Hydroponics for greenhouse vegetable production	Straver
Seedless greenhouse cucumber production	Straver
Development of methods to utilize existing tobacco kilns and/or tobacco storage barns for curing and/or storage of crops other than tobacco	VanHooren

Ornamentals

Development of alstroemeria as a greenhouse crop	Blom
Evaluation of irrigation systems for containerized production	Blom
Factors influencing greenhouse poinsettia production	Blom
Influence of soil cooling on greenhouse freesia production	Blom
Roses on rockwool	Blom
Timing of cinerarias through supplemental lighting	Blom
Apple pomace as amendment in container culture	Chong
Caliper ornamental nursery tree production using fieldgrow containers and trickle irrigation	Chong
Effect of aerial and rooting environment on rooting of woody ornamental nursery crops	Chong
Fieldgrow fabric container culture	Chong

Project Title	Researcher
Influence of growth substances on rooting of woody ornamentals	Chong
Nursery tree culture in above ground wire basket containers	Chong
Propagation in plug trays	Chong
Soil amendments for containerized nursery crops	Chong, Cline, Rinker

Food And Food Quality

Controlled atmosphere storage of apples	Chu
Development of an ethylene measurement technique to determine apple harvest maturity	Chu
Development of a starch-iodine test guide for maturity evaluation of Ontario apples	Chu
Low ethylene storage of apples	Chu
Low oxygen storage of apples	Chu
Post-harvest physiology studies on modified atmosphere packaged fruits and vegetables	Chu
Studies on cauliflower controlled atmosphere storage	Chu
Studies on controlled atmosphere storage of green bell peppers	Chu
Analysis of chemical and physical indexes of quality of juice, wine, and table grape cultivars and selections	Fuleki
Anthocyanin pigment composition of horticultural crops grown in Ontario	Fuleki
Chemical fingerprinting of fruits	Fuleki
Colour quality problems in horticultural crops and their products	Fuleki
Development of HPLC - based analytical method for quality control in the food and beverage industry	Fuleki
Development of methods for measuring external and internal colour of fruits, vegetables and their products	Fuleki
Juice potential of commercial grape cultivars	Fuleki
Ultrafiltration and reverse osmosis in beverage technology	Fuleki
Automated environment monitoring	Lauro
Development of storage monitoring technology	Lauro
Energy aspects of storage	Lauro
Engineering aspects of food processing	Lauro
Storage facility operation and management	Lauro

Project Title	Researcher
Technical and economic evaluation of fruit and vegetable storage systems	Lauro
Asparagus storage studies	Smith
Celery storage - Development of technology for MA storage of Ontario-grown celery	Smith
Crucifer crop storage studies	Smith
Improvement of cranberry growing in Ontario	Smith
Onion storage studies	Smith
Storage studies on stone fruit	Smith
Strawberries - Modified atmosphere packaging	Smith
Packing studies on pre-peeled potatoes	Wang
Processing quality studies on berry crops	Wang
Processing quality studies on peaches	Wang
Processing quality studies on tomatoes	Wang
Processing studies on mushrooms	Wang
Processing studies on strawberries	Wang
Value-added utilization studies on cherries	Wang

Pest Management And Disease Control

Chemical induction of disease resistance for the production of transplanted vegetable crops from soilborne pathogens	Brammall
Diseases of Cole Crops - Host-pathogen interactions and procedures for control	Brammall
Diseases of garlic	Brammall
Diseases of Ginseng - Host-pathogen interactions and procedures for disease control	Brammall
Diseases of Tomato - Host-pathogen interactions in selected disease systems	Brammall
Investigations on the chemical induction of disease resistance for the protection of transplanted vegetable crops from soilborne pathogens	Brammall
Vegetable pathology	Brammall
Vegetable pathology - Diseases of garlic and their control	Brammall
Reduced rates of herbicides for sweet corn	O'Sullivan
The development of herbicide programs for various horticultural crops	O'Sullivan
Weed control strategies for asparagus using fall-seeded rye	O'Sullivan
Effectiveness of methods recommended to eliminate green fixation in downdraft tobacco kilns	VanHooren

The oldest CAT college in Ontario, Kemptville was established in 1916 to demonstrate and teach modern methods of agriculture. In every decade since then, it has provided Eastern Ontario farmers with the technology and leadership that were needed to make food abundant and safe.

In the 60s, Kemptville lead the corn revolution. In the 70s and 80s, it provided the technology for growing soybeans and the diversification of farm production.

In the 90s, agronomy research emphasizes conservation of the soil and natural ways of growing to reduce herbicide and pesticide use. Horticultural research, which among other things has stimulated the growth of pick-your-own operations and strawberry production, has also turned to ornamentals. One aim is to provide expertise for the burgeoning lawn and garden enterprises.

Because Kemptville College has the highest producing dairy herd among research and educational institutions, it can lead the way in providing test information on new concepts for high producing dairy cows. Researchers have already been able to demonstrate the feasibility of a Total Mixed Ration, pioneer a colostrum management program and enhance heavy calf production and marketing across the country.

In the past decade, the Food Science and Technology section has increased its contribution to food and nutrition research, focusing on the development of dairy products and beef along with meat quality.

In addition to its traditional role of analysing trends in the farm economy and workforce, the Business Management section has been providing computer and management training for Eastern Ontario farmers and Caribbean countries.

Philosophically, Kemptville is headed for a systems approach to research, where all sections of the College work towards a sustainable and environmentally safe agricultural industry for Eastern Ontario. To this end, the library has expanded its role. Farmers and researchers will have access to data bases that can keep them current on foood science and agriculture.

Project Title	Researcher
Animal Science	
Beef	
Evaluation of chemical, physical and textural properties of veal and beef	Drevjany
Evaluation of nutritive value and economic viability of airoponically grown green fodder from barley	Drevjany
Evaluation of protein quality of oil extraction residues of evening primrose (Oenothra biennis)	Drevjany
Evaluation of the mechanical reliability, dosing precision and mixing uniformity of the TMR - Smart Mixer	Morgan
Dairy	
Development of a replacement heifer raising program, suitable for Eastern Ontario conditions	Drevjany
Using the Denco test to identify cows in need of supplementary energy	Drevjany
Development of a quick quantitative method for the content of immunoglobulins in the blood of neo-natal calves	Drevjany, McKnight, Morgan, Veira
Effect of frequency of feeding concentrates on production and health in high producing dairy cows	McKnight
Effects of long-stem hay on performance of heavy calves	McKnight
Influence of megalac on milk production by high producing cows in early lactation -effects of megalac on grain palatability and production costs	McKnight, Wheeler
Investigation of installation, cost and desirability of four manger surfaces in a tie-stall dairy barn	McKnight, Wheeler
Field Crops	
Cereal Crops Production And Management	
Nitrogen rates on spring wheat and barley	Curnoe
Barley variety evaluation	Hoekstra
Genetics and breeding of hull-less (naked) oats	Hoekstra
Oat variety evaluation	Hoekstra
Winter wheat variety evaluation	Hoekstra

Project Title	Researcher
Broadleaf weed control in barley	MacDonald
Corn Production And Management	
Comparison of chisel and moldboard plows with different crop rotations	Curnoe
Crop input comparisons on corn	Curnoe
Improving the degraded structure of fine textured soils with deep tillage and grass and legume crops	Curnoe
Hybrid corn evaluations for grain	Hoekstra
Comparison of tillage methods with respect to weed control treatments	MacDonald
Postemergent herbicide evaluation in corn	MacDonald
Preemergent herbicide treatments in corn	MacDonald
Forage Production And Management	
Drainage evaluation of persistance and yield of trefoil and alfalfa under different drainage systems	Curnoe
Grass control in seedling alfalfa	MacDonald
Horsetail control	MacDonald
Quackgrass control	MacDonald
Forage production studies and establishment procedures	Madill
Registration and performance testing of forage legumes and grass cultivars	Madill
Oilseed Production And Management	
Broadleaf weed control in soybeans	MacDonald
Imazethapyr efficacy evaluation plan	MacDonald
Nutsedge control in soybeans	MacDonald
Postemergent grass control in soybeans	MacDonald
Preemergent herbicide treatments in soybeans	MacDonald
Preplant herbicide treatments in soybeans	MacDonald
Soybean safety with clethodim	MacDonald
Tillage versus weed control in soybeans	MacDonald
Cultivar testing of natto soybeans and early lines of soybeans	Madill
Early planting dates of soybeans to assess risk of frost vs. yield	Madill
Plant population studies of soybeans to assess reduced stands on yield potential	Madill
Registration and performance testing of early cultivars of soybeans	Madill

Project Title	Researcher
Horticultural Crops	
Fruit Production And Management	
Evaluating mowing techniques for clonal vs. seedling lowbush blueberries	Morton
Evaluation of selected apple rootstock cultivar interactions for Eastern Ontario conditions	Morton
Identification of suitable lowbush blueberry lines or cultivars for production in Eastern Ontario	Morton
Yield evaluation and observation trials for raspberries	Morton
Yield evaluation and observation trials for strawberries	Morton
Vegetable Production And Management	
Asparagus Variety Trial since 1986	Langenberg
Ontario Regional Potato Variety Trial	Langenberg
Ontario Early Potato Variety Trial	Langenberg
Sweet Corn Su Cultivar Trial	Langenberg
Sweet Corn Se Cultivar Trial	Langenberg
Sweet Corn Sh-2 Cultivar Trial	Langenberg
The comparison of *Bacillus thuringiensis* and conventional insecticides for the control of European corn borer	Morton
The evaluation of *Bacillus thuringiensis* for its suitability of integration into a conventional insecticide control program to control Colorado potato beetle	Morton
Maple Project	
Maple Plantation Management	
Concentration of maple sap by reverse osmosis - an evaluation of available membrane types	Langenberg
Evaluation of growth rate of the seedlings (*Ulmus americana* "Liberty") at various Ontario locations	Langenberg
Evaluation of sanitary methods in cleaning sap conducting lines	Langenberg
Evaluation of vigor of sugar maple (*Acer saccharum*) vs black maple (*Acer nigrum*)	Langenberg
Communications And Business Management	
Agricultural Economics And Business Management	
Capital investment decisions in the dairy industry	Matura
Development and analysis of agricultural recording and management systems in selected Caribbean nations	Matura

Project Title	Researcher
Development of manuals and procedures training agricultural extension pesonnel in selected Caribbean nations	Matura
Manual: Financial concepts - special application to horticultural enterprises	Matura
Manual: Marketing principles - special application to horticultural enterprises	Matura
An analysis of the factors influencing farm managers to use investment analysis techniques for capital investment decision making	Morrison

Agricultural Engineering

Remodelling of natural ventilation systems (Demonstration)	Brunet

Project Title	Researcher

Communications

Agricultural literacy test	Wren, Meagher Morrison
Readability of farm publication	Meagher, Morrison

Food Science

Binding and texture in restructured beef steaks	Johnson
Evaluating the chemical, textural and sensory properties of veal and beef	Johnson, Reasbeck, Drevjany
Study of the nutritional status of patients with chronic obstructive lung disease	Sanderson, Reasbeck, Munt
Thermal precipitation of proteins from milk whey blends	Hunter

NEW LISKEARD COLLEGE OF AGRICULTURAL TECHNOLOGY

New Liskeard, the Ministry's most northerly college, has developed a comprehensive research program to assist farmers in this particular area. Crop testing sites have been developed in the districts of Rainy River and Thunder Bay to give farmers in the Northwest of the Province recommendations suitable to their conditions. An Agronomy Research Laboratory has been constructed as well on the New Liskeard campus, facilities which will enhance the research program there.

Research is carried out in beef cattle, field and horticultural crops, and farm management. The cow-calf herd was expanded recently to allow for a more wide-ranging program on nutrition, breeding efficiency, and feeding animals on pasture. This reflects the importance of this industry in Northern Ontario. Along with agronomic research, chiefly in barley, oats, and forages, horticultural studies in berries, sweet corn, and cole crops are helping farmers diversify.

Project Title	Researcher

Agronomy

Field Crops

Gene pool (early) corn test program	Skepasts
Intensive barley production	Skepasts
Red clover seed production in northern Ontario	Skepasts
Wheat variety testing program	Skepasts, Heard
Field crop evaluation program for northeastern Ontario	Skepasts, Rowsell
Barley variety testing program	Skepasts, Rowsell, Heard
Effect of rate of nitrogen application on barley and wheat production	Skepasts, Rowsell, Heard
Oat variety testing program	Skepasts, Rowsell Heard

Project Title	Researcher

Forage

Forage grass cultivar evaluation program	Skepasts
Forage legume cultivar evaluation program	Skepasts

Oil and Protein Seed Crops

Buckwheat seeding rate study	Heard
Canary seed seeding rate study	Heard
Protein crop evaluation	Heard
Canola variety testing program	Skepasts
Flax variety testing program	Skepasts, Heard
Field pea variety testing program	Skepasts, Heard
Soybean variety testing program	Skepasts, Rowsell, Heard

Project Title	Researcher
Soil, Water and Waste Management	
Alfalfa management study	Heard
Barley management study	Heard
Conservation tillage study	Heard
Long term sustainable crop rotation	Heard
Soil fertility investigation of nitrogen, sulfur, phosphorus and lime on forage and cereal production	Heard
Nitrogen fertilization of canola in northeastern Ontario	Rowsell
Residual nitrogen from various sources	Rowsell
Response of barley and alfalfa to limestone in northern Ontario	Rowsell
Influence of *Penicillium bilaji* on phosphorus uptake by barley and alfalfa	Rowsell, Heard
To investigate the establishment, subsequent growth and erosion control potential of certain tree and shrub species on gully and stream banks	Skepasts
Horticultural Crops	
Biennial cropping of raspberries	Hughes
Raspberry cultivar evaluation	Hughes
Strawberry cultivar evaluation	Hughes
Sweet corn cultivar evaluation	Hughes
The effects of floating row covers on fall-bearing raspberry production	Hughes
The effects of floating row covers on strawberry production	Hughes
The effects of mulches and tunnels on cucumber production	Hughes
Effects of plastic mulch on direct-seeded and and transplanted cucumbers	Hughes
Evaluation of the quality of early generation seed potatoes produced by the SPUD lab	Hughes
Animal Science	
Dairy	
Performance and economic effects of deworming suckling calves	Gumprich
Performance and economic effects of feeding milk replacer in place of whole milk to dairy calves	Gumprich
Performance and economic effects of replacing soybean meal with whole roasted soybeans for high producing dairy cows	Gumprich
Stray voltage effects on dairy cows	Gumprich
Beef	
Early versus late castration of beef calves	Gumprich
Implanting beef calves with Ralgro	Gumprich
Supplementing growing heifers on pasture	Gumprich
Sheep	
Comparison of pelleted creep feed and forward creep grazing of lambs	Sharpe
Engineering	
Natural air grain drying	Hawkins

RIDGETOWN COLLEGE OF AGRICULTURAL TECHNOLOGY

Southwestern Ontario is an agriculturally intensive region with one-third of the province's total agricultural production. It has the highest heat unit range in Canada, a favourable climate and broad spectrum of fertile soils. For nearly 70 years research programmes have been conducted at Ridgetown - first as the Western Ontario Experimental Farm (1922) and later as Ridgetown College of Agricultural Technology (1968). These research programmes have reflected and facilitated the growth of the agricultural industry in the southwest.

The swine programme has traditionally been the mainstay of livestock research with the researchers seeking to develop feeding and management strategies that will make for an efficient conversion of domestic feedstuffs into lean pork and to extend this knowledge of nutrition and management to producers.

Dairy research although limited has focused on the reproductive efficiency of dairy cows with superior milking ability. The purebred Holstein herd has consistently been the highest producing herd in Kent County.

Since the majority of the region's farmland is planted in cash crops, such as soybeans, corn and winter wheat, etc., growers' access to superior feed crop varieties and regional production guidelines is essential. Accordingly, cereals, perennial forages, including grasses and legumes, field beans, and soybean cultivars as well as corn hybrids are evaluated for licensing and monitored for recommendation on trial sites located throughout the region. As well, many fertility, cover crop, tillage and rotation experiments are conducted both on and off campus.

The main emphasis of Ridgetown College's horticultural programme is to develop production methods that will result in economical crop management. Research is conducted on tomatoes, peppers, cole crops, sweet corn, tender fruit and grapes for evaluation of regional adaptability as well as the development of plant establishment methodologies.

Recently, agricultural engineering studies have concentrated on pesticide application techniques with the testing of various types of sprayers and nozzles.

R.C.A.T.'s weed control programme seeks to improve systems to control a broad spectrum of weeds as economically as possible stressing crop safety and minimal effect on the environment.

The insects and disease programmes have continued to develop strategies and methods for improved application of pesticides in order to reduce the frequency and number of sprays and thus the total amount of pesticide usage. Where possible cultivar resistance and new chemical candidates are tested for control of costly pests such as European Corn Borer.

Research in agricultural economics has concentrated upon the development of information to improve producer marketing strategies for the major crop and livestock commodities. Programmes have also been developed which provide input for national and provincial agricultural policy formulation.

Project Title	Researcher
Animal Production	
Effect of dietary form and energy content on animal performance and carcass traits of growing-finishing steers	Fitzgerald
Effect of protein levels in finishing diets of steers deficient in ruminal escape protein in their diets in the growing period	Fitzgerald
Computer software development, livestock enterprise models for profit and sundry software development analysis	Morris, Fitzgerald, DeSchutter
Swine	
Controlled feeding programs for growing/finishing pigs	DeSchutter
Causes of preweaning piglet mortality	DeSchutter
Effect of slaughter delays on carcass shrinkage of swine	DeSchutter
Effectiveness of PST implants in improving performance of pigs to 101 kg	DeSchutter
Evaluation of alternative feed stuffs for swine	DeSchutter
Starter feeding program for young pigs	DeSchutter
Two-tiered rearing for growing pigs	Morris, Underwood
Alternative welfare housing systems for breeding, gestating swine	Morris, Underwood

Project Title	Researcher
Economics	
Agricultural options usage versus alternative marketing methods	Doidge
Analysis of Ontario cash corn and soybean price cycles	Doidge
Analysis of Ontario elevator buying/selling price spreads	Doidge
Impact of the corn countervail duty on the Ontario corn price determination process	Doidge
Examination of the behaviour of cash prices for finished feeder cattle and hogs by location and season	Dennison
Livestock industry analysis	Dennison
Option usage for livestock vs. alternative marketing methods	Dennison
A qualitative study of labour problems facing Ontario swine farms	McEwan
Financial and production competitiveness of swine farrow to finish farms	McEwan
Financial benchmarks found in Ontario swine farms	McEwan
Human resource management on Ontario swine farms	McEwan
Agricultural microcomputer distribution and service network study	Ross
Development of computerized budgeting and management aids for agriculture	Ross

Project Title	Researcher
Impact of the Goods and Services Tax and other tax policies on primary producers in agriculture	Ross
Potential for the use of computers and related electronics on the farm	Ross

Engineering

Ventilation control in swine barns	Underwood
To determine the spray pattern of 80° and 110° spray nozzles under simulated field conditions	Underwood
To improve the application targeting of crop production chemicals	Underwood

Field Crops

Grain

Tissue analysis for nutrient content as affected by fertilizer application and crop rotation	Johnston
Hybrid corn evaluation for grain and forage	Scheifele
Production studies in grain corn	Scheifele
Cereal management	Smid
Evaluation of cereal cultivars	Smid

Forage

Forage varieties and management	Scheifele

Proteins and Oilseeds

Alterations of fatty acids in soybeans	Ablett
Cultural studies in field beans	Ablett
Cultural studies in soybeans	Ablett
Development and evaluation of soybean cultivars	Ablett
Evaluation of field bean types and cultivars	Ablett

Horticultural Crops

Fruit

Cultivar evaluations in apples and tender fruit	Sikkema

Vegetables

Breeding and cultivar evaluation of processing peppers	Loewen
Breeding and cultivar evaluation of processing tomatoes	Loewen
Cultivar evaluation of horticultural crops	Loewen
Tomato, pepper plug plant research	Pitblado
Cultural management studies in processing tomatoes	Sikkema
Cultural management studies in sweet corn	Sikkema
Management studies of various vegetable crops in the greenhouse	Sikkema

Pest Management and Disease Control

Effect of herbicides on weed control and crop response in vegetable and fruit crops, transplanted and field seeded tomatoes, peppers, asparagus and fruit trees	Brown
Effect of herbicides on weed control and field corn	Brown
Studies in the control of specific weeds	Brown
Insect and disease control in field tomatoes	Pitblado
Disease control in horticultural crops	Pitblado
Insect control in horticultural crops	Pitblado
Rearing European corn borers	Pitblado
Disease control in field crops	Schaafsma
Evaluation of the resistance of malathion in populations of Indian meal moth in Southwestern Ontario	Schaafsma
Foliar insect control in field crops	Schaafsma
Soil insect control in field crops	Schaafsma
Herbicides in the control of specific weeds	Shaw
Weed control in beans	Shaw
Weed control in cereals and forages	Shaw
Weed control in vegetable crops	Shaw
Weed management systems in reduced-till field crops	Shaw

Soil, Water and Waste Management

Crop rotations and cover crop effects on erosion control, tomato yields and soil properties in southwestern Ontario	Johnston
Agroforestry research in southwestern Ontario	Nanni
Impact of soil compaction on the production of processing vegetables and other cash crops	Stevenson
Nitrogen research with corn using conservation tillage	Stevenson
Nitrogen research with winter wheat	Stevenson

Project Title	Researcher
Phosphorus and potassium soil test calibration research with corn	Stevenson
Phosphorus and potassium soil test calibration research with soybeans	Stevenson
Conservation tillage in Southwestern Ontario	Young
Crop rotation effects on crop yields and soil properties in Southwestern Ontario	Young

UNIVERSITY OF GUELPH

For over a century, the Ontario Agricultural College, the Ontario Veterinary College, and since the 1960's, other Colleges at the University have run research programs on behalf of the Ministry. The nature of these programs has changed a great deal over the years, and the scope has broadened dramatically. New disciplines such as environmental biology, plant and animal biotechnology, and energy management have been introduced to complement traditional ones such as animal husbandry and horticulture.

In the early years, research and demonstrations were held on what is now the University campus. Now, much of this work has been moved to the seven experimental farms owned by the Ministry and run, under contract, by the University: Alma (aquaculture), Arkell (swine, poultry, engineering, environmental biology), Cambridge (horticultural crops, turf management, pest management), Elora (beef, dairy, field crops, soils), Guelph (agroforestry), Ponsonby (animal helath), and Woodstock (field crops). The main areas emphasized in each of Guelph's agricultural research programs are listed below followed by the titles of current projects within each program.

Project Title	Researcher
Livestock	
Beef	
Bovine muscle metabolism and meat quality	Ball
The use of dietary supplement of anti-inflammatory agents in reduction of stress and susceptibility to lung diseases in cattle	Bray
Increasing the protein utilization in alfalfa/grass silages	Buchanan-Smith, Mowat
GTF chromium for stressed feeder calves	Mowat
Improving evaluation procedures for components of economic merit	Schaeffer, Wilton
Dairy	
The effect of forage particle size and source of fibre on rumination and productivity or early lactating dairy cattle fed silage-based rations	Allen, Buchanan-Smith
Growth rates, composition and performance of dairy replacement heifers	Buchanan-Smith
Effect of ration protein degradability on lactation response	Buchanan-Smith
Comparison of dairy cows of high genetic merit for production with varying size	Burnside, Burton McBride
Evaluation of Holstein-Friesian A.I. sires for stillbirths and ease of calving	Burnside, Schaeffer
Genetic and environmental causes of immunoglobulin levels in Canadian dairy cattle	Burnside
MOET, DOC and IVF: experimental and simulation analysis in herds of varying sizes for maximum genetic improvement	Burnside
Effect of feeding varying doses of bambermycins (flavomycin) on production responses, reproduction and health of dairy cows and heifers	Burton, McBride
Effects of plant and fish protein in preruminant calf diets on growth, health and immunological parameters	Burton
Efficacy of recombinant growth hormone (rbGH) for lactating cows	Burton
Genetic and environmental causes of immunoglobulin levels in Canadian dairy cattle	Burton, Wilkie
Characterization of genes coding for rumen fungal fibrolytic enzymes	Forsberg
Antibodies with endocrine activity: alternative methods for increasing animal performance	Gibbins
Effect of forage particle size and source of fibre on rumination and productivity or early lactating dairy cattle fed silage-based rations	Grieve
Effect of ration protein degradability on lactation response	Grieve
Growth rates, composition and performance of dairy replacement heifers	Grieve
Somatotropin in young dairy sires as a predictor for genetic merit of milk production	Hacker
Methods for genetic improvement of dairy cattle	Kennedy
Selection bias and animal evaluation methodology	Kennedy, Schaeffer

Project Title	Researcher
Is insufficient progesterone a cause of reproductive failure in dairy cows?	King, Leslie, Walton
Growth rates, composition and performance of dairy replacement heifers	McBride
Direct oocyte collection (DOC) and in-vitro fertilization (IVF) in cattle	Walton
Antibodies with endocrine activity: alternative methods for increasing animal perfprmance	Walton, Wilkie

Swine

Amino acid metabolism in pigs	Ball
Body composition and meat quality in pigs	Ball
Effect of amino acid supplementation on stress, meat quality and body composition in swine	Ball
Evaluation of porcine somatotropin (PST) for improved performance and carcass quality in finishing pigs	Ball, Bowman, Hacker
Exploitation of exogenous and endogenous growth regulators for pork production	Bayley
High levels of food intake, growth rate and efficiency of carcass deposition	Bayley
Controlling luteal function in swine	Buhr
Factors affecting the fertility of boar semen	Buhr
Effect of management parameters on dust and gas levels in a growing-finishing barn	Hacker, Morrison, Ogilvie
Enhancing cyclic activity of the post-weaned sow by tyrosine supplementation	Hacker
Growth promotion in pigs using immunization against somatostatin	Hacker
Reducing stillbirths and improving piglet viability	Hacker
Development and testing of new housing system (H-M system) for dry and gestating sows	Hurnik
Testing and development of alternative farrowing units for sows	Hurnik
Genetic improvement of pigs	Kennedy
Regulation of reproductive function in pigs	King
Application of microwave technology to rearing young piglets	Morrison
An investigation of the anabolic properties of polyamines in swine	Smith
Regulation of androstenone biosynthesis and control of boar taint	Squires
Regulation of reproductive function in pigs	Walton
Evaluation of enzyme additions to swine diets	Young

Project Title	Researcher

Poultry

Salt reduction in processed meat products	Barbut
Effects of non-traditional lighting on poultry behaviour and welfare	Duncan
Measuring the behavioural needs of poultry	Duncan
Development of methods of gene transfer in domestic birds	Etches
Isolation, identification and characterization of reproductive hormones in domestic birds	Etches
Lighting regimes for turkey toms	Etches
The control and manipulation of egg protein synthesis in domestic birds	Gibbins
Study of poultry feeding motivation	Hurnik
Development of feeding systems for poultry	Leeson
Efficacy of growth promoters, antibiotics and anticoccidials for poultry	Leeson
Manipulation of growth in broiler chickens and turkeys	Leeson
Poultry egg production curves	McMillan
The environment and efficiency of poultry production	Morrison
Factors regulating the development of a single functional ovary in poultry	Squires
Investigation of the molecular basis for fatty liver hemorrhagic syndrome	Squires

Biomedical Sciences

3-Methylindole-induced pulmonary edema and metabolic basis of prolonged pulmonary disease in ruminants	Atwal
Ultrastructural and immunohistochemical discrimination of PIMs of cattle and goat: Value of hormonal and drug manipulation	Atwal
Testicular morphogenesis and subfertility related to twinning in cattle	Basrur
Study of biology of pregnancy establishment in horses	Betteridge
Development of biotechnological methods of embryo manipulation for the advancement of animal breeding strategies	Betteridge, Blecher, Wildeman
Development of the immune reconstituted SCID and SCID-beige mouse as a generally applicable model for veterinary and agricultural research	Betteridge, Boermans, Butler, Croy, Etches, Percy, Stirtzinge, Yager
A study to design improved systems for monitoring drug residues in slaughter animals	Black
A study of the effects of levamisole on cellular responses to a respiratory virus in cattle	Black, Conlon

Project Title	Researcher
Pharmacokinetic studies of drugs and chemicals in fish	Black, Ferguson
Investigation into effects of toxins on disease resistance of cattle Development of the SCID-Bovine mouse, a murine model for evaluating immunotoxicity in cattle	Boermans
Immunopharmacological regulation of bovine inflammatory cells	Conlon
Cytokine induced endothelial alterations	Coomber
A study on gene transfer and molecular genetic markers to improve livestock productivity and health	Croy
Assessment of immunocompetent cells within the pregnant mammalian uterus	Croy
Analysis of the intersex syndrome(s) in swine	Fisher
The Hemostatic Mechanism in Cattle: Significance of the Factor XI Protein	Gentry
Adaptation of the hair follicle nuclear aberration assay for use with human hair exposed in vitro	Goldberg
The effect of rBST administration during the last trimester of gestation on mammary development in nulliparous sheep	Grieve
Investigation into the control of rumen function and food intake in ruminants	Grovum
Dermal-epidermal and other interactions in differentiation and disorders of mammalian skin	Hardy, Fallding
A study of mechanisms by which Pasteurella Haemolytica cytotoxin induces contraction of bovine airway smooth muscle	Harris, Yamashiro
Development of biotechnological methods of embryo manipulation for the advancement of animal breeding strategies	Johnson
Investigations of approaches to improving superovulation in Holstein heifers using a potent LHRH antagonist and recombinant bovine somatotrophin	Johnson, Rieger, Walton
The embryonic genome and its expression during early development	King
Effect of glucocorticoids on follicular and oocyte development in the pig	Liptrap
A study to design improved systems for monitoring drug residues in slaughter animals	McEwen, Meek
Analysis of the intersex syndrome(s) in swine	Partlow
Is Relaxin a neural lobe hormone in the pig	Porter
Is Relaxin essential for ovulation in the mare	Porter
Steroid biosynthesis in the testes of the boar	Raeside
Accumulation of thallium in the egg shells of domestic fowl	Robinson
A study on gene transfer and molecular genetic markers to improve livestock productivity and health	Wildeman

Project Title	Researcher
Pathology	
Pathogenicity of Cochlosoma anatis to ducklings	Barker, Fernando, Hunter
Determination of course of infection of Cryptosporidium spp. infections in severe combined immune deficient (SCID) mice and potential for treatment with hyperimmune bovine colostrum	Barta
Significance of neoplasia in wild fish in Lake Ontario	Ferguson, Hayes
Effects of ureaplasma diversum on bovine embryos: In vitro studies	Fernando
Host parasite interaction in the coccidia - pathogenetic	Fernando
Influence of Ureaplasm diversum on bovine embryonic development and mortality	Hayes, King, Miller
Investigation into reproductive failure and normal mortality on mink ranches	Hunter
Investigation into respiratory disease in turkeys	Hunter
Examination of the physiology and morphology of avian bone healing	Hunter, Smith
Development of a serological test and DNA probe to detect bovine immunodeficiency-like virus and their use in studies of prevalence and pathogenicity	Jacobs
Tissue factors influencing expression of bovine leukemia virus	Jacobs
Studies on lameness and leg problems in broiler chickens and turkeys	Julian
Right ventricular failure and ascites in broiler and roaster chickens	Julian
H. somnus pathogenesis and immune mechanisms of cattle	Little
Pathogenesis of bovine ocular squamous cell carcinoma	Livesey
Investigation of sudden death syndrome in turkeys	McCutcheon
Effects of ureaplasma diversum on bovine embryos: In vitro studies	Miller
Ureaplasma diversum as a cause of infertility in cattle	Miller
Reproductive performance in the Guelph Yorkshire high-low immune response pig lines	Miller, Plante
Enteritis complex in the commercial rabbit: A field study	Percy
Pathogenesis of selected viral infections of SCID mice	Percy
SDA: An important coronavirus infection in the rat	Percy
Identification and characterization of Haemophilus somnus immunogens with vaccine potential	Silva
Strongyles in equines: biology, pathogeneses, epidemiology and control	Slocombe
Pathogenesis of bovine ocular squamous cell carcinoma	Stirtzinger

Project Title	Researcher
Pathogenesis and immunity in Rhodococcus equi infections	Yager
Veterinary Microbiology and Immunology	
Evaluating bovine leukocyte antigens and other genetic markers to enhance immune response and disease resistance in Canadian holsteins	Burnside, Wilkie
The role of interferons and virus receptors in porcine transmissible gastroenteritis	Derbyshire
Development of a multivalent recombinant fowlpox virus vaccine	Derbyshire, Nagy, Krell
Development of an effective recombinant virus vaccine for transmissible gastroenteritis of swine.Part I	Derbyshire, Nagy
Verocytotoxins of porcine Escherichia coli	Gyles
Rapid detection and characterization of verotoxigenic Escherichia coli in meats	Gylesm McEwen
Survey and control of Coxiellosis in dairy goats and dairy cattle	Lang
Molecular analysis of Actinobacillus pleuropneumoniae virulence factors	MacInnes, Rosendal
Evaluating bovine leukocyte antigens and other genetic markers to enhance immune response and disease resistance in Canadian holsteins	Mallard
Genetic control of immune response and disease resistance in pigs	Mallard, Wilkie
Protective immunity to Corynebacterium pseudotuberculosis in sheep and goats	Menzies, Muckle
Role of serum resistance proteins in E. Coli mastitis	Muckle
Virulence and molecular epidemiology of infectious laryngotracheitis virus, a herpes virus of chickens	Nagy
Leptospiral abortion in swine	Prescott
Purification of protective antigens of rhodococcus equi	Prescott
Feed conversion in pigs infected with toxin producing Pasteurella multocida in the lung	Rosendal
Improved diagnostic and prophylactic procedures for the control of pleuropneumonia in Ontario swine	Rosendal
Mycoplasma induction of tumor necrosis factor	Rosendal
Pathobiology of Mycoplasma iowae	Rosendal
Host immune response to chlamydia psittaci	Shewen
Host resistance to pasteurella haemolytica	Shewen
A DNA probe for diagnosis of bovine viral diarrhea by in situ hybridization	Thorsen
Development and application of an improved serodiagnostic test for caprine arthritis encephalitis (CAE)	Thorsen
Control of salmonella contamination of poultry products by vaccination of breeder flocks	Wilkie

Project Title	Researcher
Clinical Studies	
An evaluation of diagnostic techniques in gastric ulceration in the foal	Barker, Dobson
Evaluation of the diagnostic value of real time ultrasound in the identification of subclinical suspensory desmitis in the standardbred	Bonnett, Dobson, Horne
The effect of prenatal nutrition on developing bone and cartilage in the equine fetus	Burton, Hurtig
Isolation of mycobacterium paratuberculosis in SCID mice	Butler
The pathogenesis of Johne's disease (Mycobacterium Paratuberculosis) in ruminants using SCID mouse as a model	Butler, Rosendal
An investigation of disease, production efficiency, antimicrobial use & management systems on 6 white & 6 red veal farms in Ontario	Butler, Conlon, Lumsden
An investigation into antibiotic excretion in milk following illness in dairy cows	Conlon, Sandals, Tremblay
The effect of prenatal nutrition on developing bone and cartilage in the equine fetus	Dobson
Scintographic determination of gastric emptying in pony foals	Dobson
Abnormal bone growth in copper-deficient foals	Dobson, Hurtig
External fixation: Strain, deformation and response at the bone/pin interface	Dobson, Hurtig
Physiologic responses of calves to ACTH	Gentry, Liptrap, Tremblay
Developmental orthopedic disease in hanoverian horses	Green, Hurtig
Immunocytochemical identification of equinelang, influenza virus and equine influenza virus and equine herpes virus type I in experimentally infected horses	G. H.
Characterization and comparison of in vivo and in vitro airway responsiveness in recurrent airway obstruction	McDonell, Viel
Cardiopulmonary effects of hypercapnia during constant volume controlled intermittent positive pressure ventilation (IPPV) in the horse	McDonell
A study into the characterization and treatment of airway hyperresponsiveness in standardbreds with reduced excercise tolerance	McDonell, Viel
Determination of anaerobic threshold in the horse during an incremental treadmill test	McDonell, Staempfli, Young
The cost of breathing in horses	McDonell, Staempfli Young
Peritoneal fluid analysis in periparturient mares	Meyers, Trout
External fixation: Strain, deformation and response at the bone/pin interface	Miller
Role of clostridium cadaveris in severe colitis in horses	Prescott, Staempfli

Project Title	Researcher
Scintographic determination of gastric emptying in pony foals	Tremblay
Etiology of respiratory infections in foals on large breeding operations in Southern Ontario	Viel
Histamine inhalation challenge in horses with exercise-induced pulmonary hemorrhage	Viel
Measurement of total respiratory impedence in horses at low frequencies	Young
Equine	
A field investigation of early embryonic mortality and non-pregnancy on selected breeding farms in Ontario	Bonnett, McKee, Meyers
Infectious respiratory diseases in horses: studies of the agents involved and methods for control	Thorsen, Viel, Willoughby
A study of rhinovirus infection in horses	Willoughby
Population Medicine	
The evaluation of Tilmicosin for the treatment and/or control of subclinical mastitis in non-lactating dairy cows	Barnum, Leslie, Lissemore
The effect of method of administration on the efficacy of dry cow therapy	Barnum
An epidemiologic and economic study of drug usage and residue occurrence in Ontario market hogs	Black, Howard, Liefeld, McEwen, Meek
Development and implementation of an Ontario herd level dairy monitoring program designed to reduce drug use and potential residues by promoting health	Bonnett, Leslie, Lissemore, Martin
Embryo transfer and artificial insemination	Buckrell
Tiamulin hydrogen fumarate in feed at 220 ppm for 14 days for treatment of swine dysentry	Friendship
An observational study and survey to evaluate the prevalence and effects of Fusarial Mycotoxins on swine in Ontario	Friendship, Wilson
An investigation of seasonal infertility of swine	Friendship, Hacker, Martin, Raeside
The determination of the cause of early embryonic death and the identification of factors associated with early embryonic death and litter size	Friendship, Kennedy, Martin, Wilson
An evaluation of the efficacy of a germicidal post-milking teat-dip containing hydrogen peroxide, sodium linear alkylate sulfonate and lactic acid	Leslie
The effect of antibiotic therapy in nulliparous heifers on mastitis prevalence at calving & prevalence at calving & productivity in first lactation	Leslie
The role of teat-end preparation for dry cow treatment in the development of Nocardia mastitis	Leslie
A study of the association of growth in height, weight & pelvic size with reproductive performance calving ease and productivity in Holstein heifers	Leslie, Meek

Project Title	Researcher
The evaluation of Tilmicosin for the treatment and/or control of subclinical mastitis in non-lactating dairy cows	Leslie, Muckle
The use of Corynebacterium bovis as a teat organism in the evaluation of teat dip efficacy	Leslie, Sandals
Production and somatic cell count characteristics of Ontario dairy herds	Lissemore
Development and implementation of an Ontario herd level IBR testing program	Lissemore, Martin
An epidemiological investigation of undifferentiated bovine respiratory disease in large feedlot-pen conditions	Martin, Meek
Contaminants in livestock production: A review	McEwen, Watlner-Toews
Caseous lymphadenitis: prevalence in Ontario sheep and evaluation of an ELISA infection	Menzies, Muckle
Chlamydia psittaci: seroprevalence in Ontario sheep and its relationship to reproductive performance, neonatal survivability and management practices	Menzies, Waltner-Toews
Epidemiological evaluation of an Actinobacillus (Haemophilus) Pleuropneumoniae Elisa	Metzger, Wilson
The use of chemotherapeutics in the Ontario rainbow trout industry: present state and future concerns	Moccia, Thorburn
Bacterial flora of the urethra in normal stallions	Samper
Embryo transfer and artificial insemination	Walton
Honey and Pollination	
Biology and control of parasitic mites of honey bees	Otis
Honey bee biology, management, and disease control	Otis, Scott-Dupree
Biology and control of parasitic mites of honey bees	Scott-Dupree

Engineering for Animal and Crop Production

Development of an on-farm alfalfa separating (fractionating) unit	Bilanski
Heat-processing alfalfa while drying to increase its nitrogen availability to livestock	Bilanski
Conditioning and drying of new crops	Brown, Otten
Efficient herbicide application technology	Brown
Hydrogen sulfide monitor for swine facilities	Hayward
Heat and moisture transfer through sprayed-on polyurethane insulation in high humidity environments	Jofriet , Otten
The study of bacterial movement through agricultural soils	Joy, Lee, Whiteley, Zelin

Project Title	Researcher
Air velocities in livestock buildings	Ogilvie

Field Crops

Corn

Development and improvement of corn breeding populations and inbreds	Kannenberg
Evaluation of corn hybrids	Kannenberg
Development and evaluation of corn breeding techniques	Kannenberg,Kasha, Pauls
Identification of the physiological factors that limit corn dry matter accumulation	Tollenaar
Effects of crop sequence on soil structure, stability and productivity	Vyn
Effects of hybrid selection and management on grain corn quality	Vyn
Effects of tillage systems and wheel traffic on soil structure and corn response	Vyn

Cereals

Breeding improved cultivars of oats	Falk
Breeding improved cultivars of spring barley	Falk
Breeding improved cultivars of winter barley	Falk
Cytogenetic studies in cereals	Falk,Hunt, Kasha, Reinbergs
Haploid production and utilization in cereals	Falk, Hunt, Kasha
Testing new improved varieties of cereals	Falk, Hunt
Triazoles as plant growth regulators and protectants	Fletcher
Production studies on barley and oats	Gamble
Breeding new and improved varieties of winter and spring wheats	Hunt
Molecular approaches to gene identification, isolation and transformation in cereals	Kasha
Winterhardiness in cereals	McKersie
Co-ordination of cereal production research in Ontario	Stoskopf

Forages

Forage cultivar evaluation	Bowley
Improvement of alfalfa quality	Bowley
Population development of forage legumes	Bowley
Winter hardiness of alfalfa	Bowley, McKersie
Development and application of artificial seed technology in alfalfa	Bowley, McKersie
Methodologies for sampling large round bales	Burton, Clark
Seed production studies in forage and turf species	Gamble
Application of tissue culture and molecular biology to alfalfa improvement	Pauls
Improvement of forage quality through genetic engineering	Upfold

Pulses and Oilseed Crops

Winter canola breeding and genetics	Beversdorf, Hume
Effect of genotype and environment on quality aspects of soybeans and rapeseed	Beversdorf , Hume, Tanner
Seed vigour of soybean and fieldbean	Gamble
Improving soybean nitrogen fixation and production efficiency	Hume
Spring oilseed testing and management	Hume
Winter canola testing and management	Hume
Common bean breeding and genetics	Michaels
New management systems for common bean production	Michaels
Peanut breeding and genetics	Michaels, Tanner
Development and utilization of biotechnology for oilseed crop improvement	Pauls
Soybean breeding and evaluation	Tanner

Pasture and Grazing

Efficiencies of growing and finishing cattle of two frame sizes on differing forage/grain feeding programs	Allen, Ball
Grazing response of forage mixtures	Buchanan-Smith
Production and reproduction of genotype-feeding combinations of fall-calving cows using roughland pasture	Buchanan-Smith, Walton, Wilton
Production and reproduction of genotype-feeding combinations of spring-calving cows using roughland pasture	Buchanan-Smith, Walton, Wilton
Production and reproduction of genotype-feeding program combinations of spring-calving cows in a confinement system	Buchanan-Smith, Clark, Walton, Wilton
Production and reproduction of genotype-feeding program combinations of spring-calving cows on an intensively managed pasture	Buchanan-Smith, Walton, Wilton
Efficiencies of growing and finishing cattle of two frame sizes on differing forage/grain feeding programs	Buchanan-Smith, Wilton

Project Title	Researcher
Cultivar by cultivar interactions between orchardgrass and white clover	Clark
Grazing response of forage mixtures	Clark
Perennial grass legume pasture mixtures	Clark
Sward height in grazing management	Clark

Horticultural Crops

Vegetables

Carbon partitioning and plant environment interactions in greenhouse vegetable crops	Dixon, Grodzinski
Physiological and biochemical mutants of nitrogen assimilation in the nodulated legume	Michaels
Responses of vegetable crops to industrial pollutant stress	Ormrod
Genetic improvement of pea via cell culture methods	Saxena
Incorporation of turnip mosaic virus resistance into rutabaga breeding	Shattuck
Physiological and biochemical mutants of nitrogen assimilation in the nodulated legume	Shattuck, Shelp
Evaluation of the nitrogen and boron nutrition of broccoli by analysis of transport fluid composition	Shelp
Minituber seed potato production from in vitro plant materials	Souza-Machado
Stabilization and development of triazine resistant broccoli genotypes	Souza-Machado
Assessment of transposon mutagenesis for tagging genes in pea	Strommer
Genetic basis of ozone tolerance in pea	Strommer
Carbon partitioning and plant environment interactions in greenhouse vegetable crops	Tsujita
Asparagus variety improvement and cultural practices	Wolyn
Breeding and evaluating potato varieties for Ontario	Yada

Tree Fruits and Small Fruits

Production techniques for tree fruits, particularly apple	Proctor
Raspberry breeding	Sullivan
Strawberry breeding	Sullivan
Strawberry management	Sullivan

Project Title	Researcher

Ornamentals

Environmental influence on water status of greenhouse roses	Dixon
Plant-environment interactions in greenhouse roses	Dixon, Grodzinski, Murr, Tsujita
The influence of cultural practice on landscape trees	Lumis
Physical, chemical & environmental parameters in container growing	Lumis
Mass propagation of geranium via artificial seeds	Saxena
Effects of environmental stress on gene expression	Strommer
Recirculation nutrient solution systems and flower crop nutrition	Tsujita

Turfgrass

Nutrient requirements and response of turf to fertilizers	Bates
Competitive ability of turfgrasses	Eggens
Development of geographically based turf management software	Eggens
Turfgrass cultivar evaluation	Eggens
Turf renovation	Eggens
Fate and persistence of pesticides used on turf: chemical and non-chemical control of weeds in turf	Hall, Stephenson
Bioassay agents to detect fungicide residues in turfgrass soil	Hsiang

Pest Management and Disease Control

Weeds

Biological control of weeds	Alex
Evaluation of new herbicide treatments for control of weeds in field crops	Anderson, Swanton
Induction of herbicide tolerance in plants with triazoles	Fletcher
Reduction of glyphosate rates for the control of broad-leaved trees in conifers	Fletcher
Immunochemical assays for the detection of herbicides in soil, water and plants	Hall
Physiology and biochemistry of herbicide selectivity in plants	Hall, Stephenson
Integrated weed management systems for muck crops	Souza-Machado
Weed control in conservation tillage	Swanton
Integrated weed management in corn, soybeans and white beans	Swanton

Project Title	Researcher
Insect Control	
Biology and control of insects affecting the production of forage and field crops	Ellis
Control of the onion maggot	Harris
Pesticides for minor crops	Harris
Biology of orchard insects	Laing
Biosystematics of decay-related diptera	Marshall
Physiological and behavioural studies on production and management of beneficial arthropods	Schmidt
Management of insect pests of potato	Sears
Pesticide exposure in applicator, agricultural workers and bystanders	Solomon
Arthropod & vertebrate pest control as related to livestock & poultry	Surgeoner
Plant Diseases	
Biological control of weeds using fungi	Barron, Stephenson
Epidemiology and biological control of diseases caused by sclerotinia sclerotiorum	Boland
Molecular basis of plant-pathogen interactions	Goodwin
Biology and management of blackleg of rapeseed	Hall
Fungicide resistance of a plant pathogen, sclerotinia homoeocarpa	Hsiang
Biocontrol of grey mold fruit rot of strawberries	Sutton
Epidemiology and biocontrol of leaf scorch in strawberries	Sutton
Food	
Oxidative rancidity and flavour deterioration in meat products	Barbut
The use of MDPM in further processed products	Barbut
A market and economic evaluation of merchandising aged and portion-sized beef	Braga
Analyzing the costs and benefits of technical research	Braga, Funk
Identifying consumers' concerns in the organic food industry in Ontario	Braga
An investigation of seniors' food purchasing behaviour: market implications for the Canadian food system	Braga, Funk
On-line sensors in processed food systems	Davidson
Automatic computer control and optimization of cyclone bioreactor system for acetic acid fermentation	Duitschaever

Project Title	Researcher
Formulation of milk and fermentation with strains of bifidobacterium and lactobacillus acidophilus	Duitschaever
Improving the organoleptic quality of irradiated food	Ferrier, Yada
Food components at subzero temperatures -- the impact on food freezing and associated quality parameters	Goff
Utilization of milk proteins to improve the yield and quality of tofu	Hill
Assessment of trans fatty acids in Ontario foods	Holub
Evaluation of the fat composition and omega-3 fatty acid status of Ontario fish products	Holub
Acid degumming of soybean and canola oils	Kakuda
The role of native and bacterial proteases on the age gelation of UHT milk	Kakuda
Storage and cultural techniques to extend the postharvest life of apples	Lougheed
Storage procedures for selected vegetable crops as potential import replacements	Lougheed
A market and economic evaluation of merchandising aged and portion-sized beef	Martin
Investigation of the hard-to-cook defect in Ontario white beans	Michaels, Stanley
Post-mortem technology coupled with re-structuring for low salt and fat processed meats	Mittal
Chill-injury in Ontario tomatoes	Murr, Stanley, Yada
Improvement of the quality of sprout damaged wheat flours	Rasper
Water-solubles as predictors of soft wheat quality	Rasper
An investigation of the major factors influencing the stability and quality of restructured meat products	Stanley
Relationships between meat yield and meat quality	Swatland
Analyzing the costs and benefits of technical research	Van Vuuren
Factors regulating the processability of Ontario-grown potatoes	Yada
Aquaculture	
The effect of polyamines on growth and food consumption of rainbow trout	Cowey
The requirement for sulfur amino acids and their metabolism by young rainbow trout	Cowey
The utilization of stable forms of vitamin C by young rainbow trout	Cowey
Gene probe for infectious pancreatic necrosis virus of fish	Dobos, Stevenson
Gill diseases of fish	Ferguson

Project Title	Researcher
Evaluation of metabolic processes occurring during accelerated growth in rainbow trout	Leatherland
Preparation of monoclonal antibodies to salmonid pituitary hormones for development of hormone assays	Leatherland
Genetic characterization of commercial rainbow trout stocks.	McMillan
Rainbow trout spawning study	McMillan
Simulation of breeding programs in farmed salmonids	McMillan
Use of triploidy induction in the improvement of rainbow trout production traits	McMillan
Aquaculture statistics and industry evaluation for Ontario	Moccia
Manure characterization and disposal routes for aquaculture waste	Moccia
Semen evaluation and cryopreservation studies in salmonids	Moccia
Studies on the effects of Beta-agonists on intermediary metabolism and growth performance in rainbow trout	Moccia
The role of ethylamine and putrescine in overcoming soybean protein toxicity in rainbow trout	Smith
Gene probe for enteric redmouth disease of fish	Stevenson
Fish species susceptibility to yersinia ruckeri	Stevenson
Gene probe for infectious pancreatic necrosis virus of fish	Stevenson

Soil, Water and Waste Management

Agrometeorology

Forage quality as affected by atmospheric drying conditions and rainfall	Brown
Scheduling irrigation for optimum water use and yield of potatoes	Brown
Measurement and estimation of crop microclimates for pest management	Gillespie
Acquisition and compilation of agroclimatological data	Gillespie, King
Investigation of planetary boundary layer models to estimate regional-scale climates	Gillespie, Thurtell
Flux of greenhouse gases between agricultural surfaces and the atmosphere	King
Turbulent diffusion processes and trace gas detection	Thurtell

Water Management in Agricultural Watersheds

Control of soil erosion and associated water pollution	Dickinson
Toxicity of Margosan-0, a product of Neem, to selected aquatic invertebrates	Kaushik
Control of soil erosion and associated water pollution	Rudra
Nitrate concentrations in shallow groundwater as influenced by application rates of nitrogen	Whiteley
Sources of contamination in outflow from tile drains	Whiteley

Agricultural Resources Inventory and Use

Developing a local land evaluation system	Brown, Taylor
Development of a rating system to evaluate agricultural land at the local level - phase II	Brown, McBride, Hilts
Development of a land rating index for agricultural performance in Ontario	Mage
Characterization of soil compaction and its agronomic significance	McBride
An evaluation of the economic viability of rehabilitating severely-eroded croplands	McBride , Stonehouse
Land evaluation for local agricultural land use policy	Penfold
Socio-economic factors in local land rating	Penfold, Rodd
An evaluation of crop residue monitoring utilizing satellite data	Protz
Development of an index of soil quality	Protz
Implementation of landsat and spot satellite resource data into a microcomputer based county level geographic information system	Protz
Land rating for agriculture	Smit
Evaluation of Land Stewardship Program	Van Vuuren
Impact of farm tenancy on agricultural land use	Van Vuuren
Relationship between soil quality and land conversion cost	Van Vuuren

Soil and Water Management for Crop Production

Development and evaluation of methods for prediction of macro/micronutrient requirements of crops	Bates
Use of sewage sludge on agricultural land with emphasis on plant availability of heavy metals	Bates
Manure N availability to corn	Beauchamp
Evaluation of a nitrogen soil test and the fate of fall applied N	Beauchamp, Kachanosk
Prevention of nitrate contamination of groundwater from fertilizer	Beauchamp, Kachanosk
Modelling the quality of surface and tile drainable water	Dickinson, Rudra

Project Title	Researcher
Field techniques for measuring the hydraulic properties of soils	Elrick
Prevention of nitrate contamination of groundwater from fertilizer	Elrick
Evaluation of soil additives for erosion control	Groenevelt
Crop production and soil loss in variable topography	Kachanoski, Miller
Soil and crop management practices to enhance soil structural stability	Kay
Methods of application of fertilizer at planting for corn in conservation tillage systems	Miller
Field validation of the Guelph wind erosion assessment model	Nickling
Crop residue management and phytotoxin effects under conservation tillage	Voroney
Identification of soil management and cropping practices which sustain the capability of a soil to accept, cycle and store organic matter	Voroney

Farm Management, Production Economics, Resources and Inputs

Project Title	Researcher
Stewardship enhancement techniques for farm-level soil conservation	Blackburn
The economic implications of technical barriers in the pork sector	Braga, Goddard, Larue
A comparison of nearby and contract month basis values for corn and soybean, and live cattle in Ontario	Braga
Farm structure and performance in Canada	Brinkman
Human resource management on the farm	Brinkman
Management, behaviour and technology on Ontario swine farms	Brinkman, Howard, Martin
Performance and competitiveness of the dairy industry	Brinkman, Weersink
Management and behavioural characteristics of Ontario hog farms (sub-project 2a)	Brinkman, Pletsch, Stonehouse
Systems analysis of pasture/cash crop rotations	Clark, Stonehouse, Wilton
Agricultural production systems and environmental protection	Fox
Economics of technological change in the livestock sector	Fox
The economics of conservation tillage in southwestern Ontario	Fox
The effectiveness of advertising milk in Ontario	Funk, Goddard
Economics of agroforestry in Ontario's tobacco belt	Gordon, Penfold, Stonehouse
Stewardship enhancement techniques for farm-level soil conservation	Hilts
Human resource management on the farm	Howard
The economics of mastitis control practices on Ontario dairies	Howard, Leslie, Meek
The impact of freer trade on the alcoholic beverage industry in Canada	Larue
The quantitative assessment of domestic and international trade policies	Meilke
Risk management in agriculture	Meilke, Turvey, Weersink
Production opportunities on non-prime lands	Smit
Stewardship enhancement techniques for farm-level soil conservation	Stonehouse
Technical and economic comparisons of alternative farming systems	Stonehouse, Swanton, Weersink
Regulatory, efficiency and management issues affecting rural financial markets	Turvey
Agricultural production systems and environmental protection	Turvey, Weersink
An evaluation of management, technology and economic performance of Ontario hog farms	Turvey, Weersink
Food processing in Canada: assessment of structure and competitiveness	Van Duren
Economic thresholds for weed densities in Ontario soybeans	Weersink

SPECIAL RESEARCH FUND

A fund was established within the budget of the office of the Executive Director, Education and Research Division in 1983 to carry on special research efforts originally covered by a four year, five million dollar award program of the Provincial Lottery. In the intervening period, a Special Research Advisory Committee, a sub-committee of ARIO, accepted and evaluated unsolicited research proposals from a broad range of research establishments and concerning a wide spectrum of topics. The projects supported were up to three years in duration, addressed research priorities of the Ontario Agricultural Services Co-ordinating Committee (OASCC), had, or would attract, financial support from industry, marketing boards, producer associations or individuals, and were of a developmental nature. The fund grew to $600,000 per year in 1987-88. Also in that year, a portion of the funds was ear-marked for cost-shared pest management research, and applied engineering research.

With the introduction of the various Competitive Research Funds, the Special Research Fund, as it was known, was gradually phased out. 1990-91 was its final year.

The following is a list of the projects active during 1990-91: A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
Fate of manure nitrogen at the Arkell, Elora, and Ponsonby research stations	Beauchamp/U of G
Forage quality as affected by weather during hay drying	Brown/U of G
Investigation into cardiovascular disease in heavy male turkeys in Ontario	Hunter/U of G
Development of a prototype delivery warning device for large farm animals	Hurnik/U of G
Loads on walls of bunker (horizontal) silos	Jofriet/U of G
Development of the maple woodlot.	Langenberg/KCAT
An epidemiological study of antibiotic residues in bulk milk from Ontario dairy farms	McEwen/U of G
Enteritis complex in the commercial rabbit: a field study	Percy/U of G
Evaluation of the nitrogen and boron nutrition of broccoli by analysis of transport fluid composition	Shelp/U of G
Development of a management system for various seed discolouration problems affecting production and export of Ontario white beans: microbiological and toxin study	Whitfield/ SWOARC*
A systems approach to research into pest management in field corn	Tu/SWOARC*

** SWOARC - South Western Ontario Agricultural Research Corporation*

FOOD SYSTEMS 2002 - PEST MANAGEMENT RESEARCH PROGRAM

Designed to reduce pesticide use while maintaining economic crop yields, sustainable farming, and effective pest control at moderate cost, this program began in 1988 and will continue until 1993. It will provide $3.9 million over five years for research in three main areas:

- non-chemical alternatives for pest control such as biological compounds, breeding for plant resistance, etc.
- development of multi-faceted pest control systems
- improvement of pesticide application technology and the disposal of pesticide containers and unusable chemicals

Eighty-seven projects have been funded to date. A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
Transgenic potato plants resistant to viruses: an alternative to reduce chemical pesticide for the control of insect vectors of potato viruses	Abouhaidar/U of T
Biological control of weeds of row crops	Alex/U of G
Selection for resistance to maize pests in low heat unit hybrids of maize for Eastern Ontario	Amason/U of Ottawa
Introduction & evaluation of Anaphes Sordidatus, parasitoid of carrot weevil eggs in Ontario	Boivin/McGill U
Biological control of Sclerotinia Sclerotiorum with fungal viruses	Boland/U of G
Investigations on the chemical induction of disease resistance for the protection of trans-planted vegetable crops from soilborne pathogens	Brammall/HES
The biology and control of perennial nightshade species in field & horticultural crops - Part A	Brown/RCAT
The biology and control of perennial nightshade species in field & horticultural crops - Part B	Cavers/U of Western
The fate of seeds produced by dicotyledenous weeds in herbicide evaluation plots	Cavers/U of Western
Strategies for control of fusarium yellows and tarnished plant bug on celery	Cerkauskas/Ag.Canada
Control of San Jose scale & European fruit scale on Ontario grown apples by low-oxygen controlled atmosphere storage	Chu/HRIO
Development & application of DNA probe for specific detection of common & fuscous blight bacteria in field bean seed	Dhanvantari/Ag.Canada

Project Title	Researcher/Location
Evaluation of alternative chemical thinning material to replace carbaryl as a chemical thinner for apple	Elfving/HRIO
Develop monitoring methods for oviposition by corn rootworms in field corn & measure egg quality and overwintering	Ellis/U of G
Feasibility study on the control of slugs in commercial crops	Ellis/U of G
Leaf removal studies on vinifera grapevines to reduce botrytis bunch rot and improve fruit quality	Fisher/HRIO
Transfer of disease and stress tolerance into tomato by cell fusion	Gleddie/Carleton U
The integration of reduced levels of herbicide in conjunction with tillage & crop rotation for the control & seed bank depletion of velvetleaf & nightshade	Hamill/Ag.Canada
A literature review & position papers on economic, food safety & environmental impact of organic vs conventional farming	Hofstra/U of G
Organic and conventional crop production and reduced herbicide use	Hume/U of G
Effectiveness and environmental impact of the granulosis virus of the codling moth in apple orchards	Jaques/Ag.Canada
Enhanced crop resistance to plant disease using bacterial inoculants	Lazarovits/ Esso Chemical Canada
Studies on the adaptation for survival of verticillium Dahliae Microsclerotia & the effect of specific inhibitors & biological control agents on their longevity	Lazarovits/Ag.Canada
Matted ground cover for reduced herbicide need & sandblasting protection of field-seeded processing tomatoes	Liptay/Ag.Canada
Bacterial speck of tomato: Characterization of pathogenicity and virulence factors	Morris/Uof Western
Reduced rates of herbicides in sweet corn	O'Sullivan/HES
Weed control strategies for asparagus using fall- seeded rye	O'Sullivan/HES
Management of acaricide resistance in the European red mite panonychus ulmi(KOCH)	Pree/Ag.Canada
Development of an integrated biological and chemical control program for toabcco seedlings (greenhouse) diseases caused by rhizoctonia and pythium	Reeleder/Ag.Canada
Development of biological controls for foliar diseases of tomato, potato & ginseng	Reeleder/Ag.Canada
Biological control of mushroom flies with entomopathogenic nematodes and microbial insecticides	Rinker/HRIO

Project Title	Researcher/Location
Effects of leafhopper feeding and manual defoliation at various stages of drybean growth	Schaafsma/RCAT
Evaluation of alternative material for the control of the Indian meal moth in grain storage bins in Ontario	Schaafsma/RCAT
New technology for insecticide placement to control soil insects in row crops at cultivation time	Schaafsma/RCAT
Weed control recommendation system	Schleihauf/OMAF
Management of colorado potato beetle & other pests of potatoes	Sears/U of G
Workshop on future directions of potato IPM in Ontario	Sears/OMAF
The control of powdery mildew on Ontario-grown rutabagas	Shattuck/U of G
Efficacy & degradation of alternative herbicides to allidochlor in onions, including nutsedge and wind erosion control	Souza Machado/ U of G
Identification of weeds and native plants as reservoir hosts for the tomato spotted wilt virus and the western flower thrips	Stobbs/Ag.Canada
Economics of low-input agriculture & alternative systems for the management of weeds in Ontario field crops	Stonehouse/U of G
Health management in strawberries for high productivity of fungicide-free fruit	Sutton/U of G
Determination of the critical period of weed interference in corn (zea mays l.) & soybeans (glycine max l.)	Swanton/U of G
Effects of ground cover, thinning agents & pesticides on mites in apple orchards	Thistlewood/Ag.Canada
Evaluation of a sampling strategy for spotted Tentiform Leafminer	Thistlewood/Ag.Canada
Crop-weed models for corn and soybeans	Tollenaar/U of G
To determine the spray patterns of 80 degree & 110 degree spray nozzles under simulated field conditions	Underwood/RCAT
Control of white grubs and European chafer on turf	Vaughn/ Vaughn Agr.Research
Evaluation of summer oils for integrated mite management on apples	Vaughn/ Vaughn Agr. Research
Monitoring and control of apple scab with minimal fungicide residues	Warner/Ag.Canada
Economic thresholds of weeds in soybeans and corn in Ontario	Weaver/Ag.Canada
To determine the effect of spidermite feeding on soybeans and develop better methods of control	Whitfield/Ag.Canada

LAND STEWARDSHIP RESEARCH PROGRAM

Begun in 1987, this program was designed to expand the current base of knowledge that will assist farmers in the adoption of cost effective soil conservation practices. $2.25 million was provided over three years for 21 projects at eight different Ontario research institutions. Areas of research dealt with were:

- practical, cost effective stewardship systems
- options for marginal and lowland areas
- ditchbank stabilization
- windbreaks and shelterbelts

A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
Improving the degraded structure of a clay loam soil with deep tillage & grass & legume crops	Curnoe/KCAT
Agroforestry research and development	Gordon/U of G
Crop rotations & cover crop effects on erosion control, tomato yields & soil properties in Southwestern Ontario	Johnston/RCAT
Nitrogen conserving farm systems	Kachansoki/U of G
Soil stewardship cropping systems for corn & soybean production in Ontario	Kay/U of G
A cover cropping strategy for first early potato production	McKeown/HES
Agroforestry research in Ontario	Nanni/RCAT
Management of fine textured poorly drained soils for intensive agriculture: characterization of a forage factor - Part I	Oaks/U of G

Project Title	Researcher/Location
To investigate the establishment, subsequent growth and erosion control potential of certain tree & shrub species on gully and stream	Skepasts/NLCAT
Crop rotation effects on crop yields and soil properties in Southwestern Ontario	Stevenson/RCAT
Impact of soil compaction on the production of processing vegetables and other cash crops	Stevenson/RCAT
Nitrogen research with corn using conservation tillage	Stevenson/RCAT
Management of fine textured poorly drained soils for intensive agriculture	Stone/Ag.Canada
Response of the soil microflora and fauna to spring plowing of zerotill and pasture soils	Thomas/U of G
Differences in soil conservation between operator-owned and rented land	Van Vuuren/U of G
Cropping and soil management effects on the dynamics of crop residue derived-N on the coarse textured soils in Southern Ontario	Voroney/U of G

AGRICULTURE AND FOOD RESEARCH PROGRAM

Initiated in 1986 to support innovative, high risk, non-traditional agriculture and food research, this five year, $10 million program ($2 million per year) supported 88 projects in such areas as:

- plant and animal biotechnology
- high technology monitoring and control of livestock facilities and crop storages
- high technology application in food processing and packaging
- market research to evaluate technology application, new products for Ontario farmers, and non-traditional markets for existing commodities

A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
Control of seed molds to improve quality of soybean seed - Part B	Anderson/Ag.Canada

Project Title	Researcher/Location
Development of biotechnological methods of embryo manipulation for advancement of the embryo transfer industry (Part II)	Betteridge/U of G

Project Title	Researcher/Location
Development of alfalfa for somatic seed hybrid production	Bowley/U of G
Computer automated greenhouse environmental control based on direct measurement of plant response	Dixon/U of G
Automatic computer control and optimization of a cyclone bioreacter system for acetic acid fermentation	Duitschaever/U of G
Formulation of milk and fermentation with strains of bifidobacterium and lactobacillus acidophilus	Duitschaever/U of G
Effects of growth regulators on apple chemcial thinning	Elfving/HRIO
Isolation, culture & intraspecific transfer of chicken primordial germ cells	Etches/U of G
Manipulation of enzymic cleavage of structural inhibitors in fibre to enhance forage digestion in cattle	Forsberg/U of G
Chemical fingerprinting of fruits: detection of fraudulent activity in fresh and processed fruits	Fuleki/HRIO
Breeding strategies to exploit new biotechnologies in dairy cattle	Grieve/U of G
Evaluation and optimization of beef cattle breeding systems using multiple ovulation & embryo transfer	Grieve/U of G
Application of cell & tissue culture to the identification of genes conferring resistance to blackleg disease of rapeseed	Hall/U of G
Benefits of ultrafiltered milk for cheesemaking	Hill/U of G
Processes and formulations for new extrusion/ baking technology	Holme/Griffith Lab.
A gene transfer system for the commercial mushroom	Horgen/U of T
Marcury Mark III - Automated field transplanters	Horlings/Marcury Ent.
Natural air grain drying pilot project	Kirik/NLCAT
Coccidiosis vaccine through Corynebacterium Biotechnology: incorporation of the genes of eimeria tenella into eimeria acervulina	Lee /Vetech Lab
Definition of bacterial pathogenicity factors in bovine haemophilus somnus septicemic, pneumonic & genital isolates	Little/U of G
Micro-perforated plastic packages for fruits and vegetables	Lougheed/U of G
A market and economic evaluation of merchandising aged & portion sized beef	Martin/U of G

Project Title	Researcher/Location
An investigation to identify virulent strains of ureaplasma diversum and their components	Miller/U of G
Protective immunity to Corynebacterium pseudotuberculosis in sheep and goats	Muckle/U of G
Application of growth promoting rhizobacteria for the improvement of the performance of potato in Ontario	Nowak/Nova Scotia Agric. College
The use of tissue culture methods to create yellow-seeded canola	Pauls/U of G
Gene transfer biotechnology in swine	Phillips/U of G
Development of biotechnological methods of embryo manipulation for advancement of the embryo transfer industry - Part I	Porter/U of G
Implementation of landsat & spot satellite resource data into a microcomputer based county level geographic information system	Protz/U of G
Development of DNA probes for the identification and quantification of verticillium albo-atrum & verticillium dahlia in alfalfa	Robb,Nazar/U of G
Control of seed molds to improve quality of soybean seed - Part A	Schaafsma/RCAT
Physiological and biochemical mutants of nitrogen assimilation in the nodulated legume	Shelp/U of G
Development of technology for modified atmosphere storage of Ontario grown celery	Smith/U of G
Modified atmosphere packaging biotechnology for fresh market strawberries	Smith/HRIO
Improved stress tolerance and agronomic traits of important potato varieties in Ontario	Thompson/U of G
Host target cell characteristics & viral genetic variation in the pathogensis of bovine leukemia virus-assocoited syndromes	Valli/U of G
Antibodies as hormones: the use of anti-idiotypic antibodies to enhance animal performance	Walton/U of G
Modified Atmosphere Packaging (MAP) of minimally processed Ontario-grown vegetables	Wang/HRIO
Genetic control of immune response and disease resistance in pigs	Wilkie/U of G
Improving the organoleptic quality of irradiated food	Yada/U of G
A simplified process for the combined utilization of corn & corn residues for the production of fuels & chemicals	Yu/Stake Techn.

ONTARIO PORK INDUSTRY IMPROVEMENT PLAN RESEARCH PROGRAM

This $5.5 million program began in 1986 to improve the competitive position of Ontario pork producers and to identify new knowledge and technologies that will improve the production and processing of pork. Currently in its final year, this program supported 49 projects and addressed needs in the following areas:

- swine artificial insemination
- mycotoxins in corn
- economically important swine diseases
- pork quality
- pale soft exudative (PSE) pork
- swine infertility
- the effects of environmental influences on pork production and pork quality

A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
The effect of new growth promotants on meat quality in swine	Ball/U of G
The relationship between amino acid metabolism lean tissue growth and PSE pork	Ball/U of G
Ear mold resistance in Ontario corn hybrids	Bolton/Ag.Canada
The investigation of the transient nature of hazardous conditions in swine barns due to manure gases released	Clarke/KCAT
Development & application of techniques to improve the quality of frozen boar semen	Fiser/Ag.Canada
The incidence of PSE pork in the four major Ontario plants & the influence of conditions in these plants on the incidence of PSE	Fortin/Ag.Canada
The influence of farm conditions on the development of PSE in pork	Fortin/Ag.Canada
An investigation of seasonal infertility of swine in Ontario	Friendship/U of G
Mycotoxin testing	Hough/Ontario Corn Producers Assoc.
Genetic improvement of swine through optimum use of Ontario genetic resources	Kemp/OMAF
The determination of the cause of early embryonic death & the identification of factors associated with early embryonic death & litter size	Martin/U of G
Rapid method for assessment of maize ear rot resistance	Miller/Ag.Canada
Determination of the effect of different ventilation rates, recirculation systems & management parameters on dust and gas levels in swine buildings	Morrison/U of G

Project Title	Researcher/Location
Development of monoclonal antibodies for detection of antibody porcine sera	Nielson/Ag.Canada
Definitive-diagnosis of susceptibility to porcine stress syndrome: development of a cost-effective protocol for clinical application	O'Brien/U of G
Dietary undetermined anion - practical application in the management of pork quality (PSE) and heat stress in swine	Patience/ U of Saskatchewan
The possible involvement of relaxin in porcine hypogalactia	Porter/U of G
Development of a subunit vaccine for haemophilus pleuropneumonia - Part II	Potter/Uof Saskatchewan (VIDO)
Fusaric acid in swine feedstuffs	Smith/U of G
Detection and control of taint in boar carcasses (project B only)	Squires/U of G
An evaluation of management, technology & economic performance of Ontario hog farms	Stonehouse/U of G
Development of rapid diagnostic tests for identifying mycotoxins & evaluation of suspected interactions	Trenholm/Ag.Canada
The effect of environmental influences on pork production under housing/penning systems	Underwood/RCAT
To evaluate the Ontario pork industry improvement plan	White/Inforesults Ltd.
An observational study & survey to evaluate the prevalence and effects of fusarial mycotoxins on swine in Ontario	Wilson/U of G

RED MEAT PLAN RESEARCH FUND

This five-year, $3.3 million fund was started in 1984 to improve the productivity of the red meat industry in Ontario. The last of the final reports are being submitted for the 41 studies in beef and sheep industry research priorities.

A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
The influence of genetics on meat quality of beef	Ball/U of G
Sheep artificial insemination & embryo transfer	Buckrell/U of G
The development of a miniature implantable electronic identification system for beef cattle	Cadell/CME Telemetrix
A study of effects of levamisole on cellular responses to a respiratory virus in cattle	Conlon/U of G
Estimation of trends in productivity and efficiency traits in herds and flocks enrolled in the red meat plan	Kemp/OMAF

Project Title	Researcher/Location
Haemophilus somnus immunogens and bovine gm-csf: a new nonantibiotic approach to disease resistance for cattle	Little/U of G
Electronic I.D. of beef cattle: live animal version implant	Marshall/Anitech Identification Systems
Shepherds - sheep health & productivity study	Menzies/U of G
Species comparisons of legume-grass mixtures for pasture use in Ontario	Pollock/NLCAT

RED MEAT RESEARCH PROGRAM

This program began in 1989 and will continue until 1994. It provides $1.1 million per year and over the life of the program will allot $4.0 million to beef research, $1.0 million to sheep research, and $0.5 million to goat research.

In the beef area, focus is on respiratory diseases, productivity and genetic improvement. Sheep research emphasizes pasture improvement, artificial insemination, and diseases of sheep. Goat research covers Caprine Arthritis Encephalitis (CAE) diagnostic test development, and the establishment of a Goat Herd Improvement Program.

To date 49 projects have been funded. A complete list of projects over the life of the program is available.

Project Title	Researcher/Location
Meat quality	Ball/U of G
Reproductive efficiency, feedlot performance, carcass composition and meat quality from prolific and standard breeds of sheep	Ball/U of G
A study to design improved systems for monitoring drug residues in slaughtered animals	Black/U of G
An investigation of disease, production efficiency, anti-microbial use and management systems on six white and red veal farms in Ontario	Blackwell/U of G
Investigation into effects of toxins on disease resistance of cattle. Part A: Development of SCID-bo mouse : a murine model for evaluating the toxicity of Terbufos & T-2 mycotoxin on bovine immune	Boermans/U of G
Influence of feeding forage on beef quality	Buchanan-Smith/U of G
Development and evaluation of a software program for the management of sheep under accelerated breeding program in Ontario	Buckrell/U of G
Further study into the development and application of a commercial AI program for Ontario sheep producers	Buckrell/U of G
Development of an infrastructure for information gathering on management, health and productivity of meat goats and record of performance for genetic evaluation	Burnside/U of G
Pathogenesis of Johne's disease, mycobacterium paratuberculosis (MPTB) in ruminants using the severe combined immunodeficient (SCID) mouse as a model	Butler/U of G

Project Title	Researcher/Location
Clarification of species listeria monocytogenes & its separation for other listerias of no health hazard by electrophoretic and cultural methods	Clark/U of T
Microbiological standards for foodstuffs - a literature review	Collins-Thompson/ U of G
Impact of chemotherapeutic agents and aquacultural pollutants on fish assessment using immune response in gills	Ferguson/U of G
Development of economic merit indices for efficient beef production	Grieve/U of G, Kemp/OMAF
Organoleptic inspection methodology of edible animal products: a literature review	Gullet/U of G
Sensory evaluation	Gullett/U of G
Rapid detection of verotoxigenic escherichia coli in meats & characterization of verotoxigenic escherichia coli associated with beef	Gyles/U of G
Studies on bovine pasteurellosis: Part B: a study of mechanisms by which pasteurella haemolytica cytotoxin induces contraction of bovine airway smooth muscle	Harris/U of G
Evaluation of the composition and textural properties of white veal, red veal and beef	Johnson, Drevjany/ KCAT
Development of genetic evaluation procedures for the Ontario sheep flock improvement program	Kemp/OMAF
Evaluation of rapid tests used for the detection of antibiotic residues in bulk milk	Lachowsky/OMAF

Project Title	Researcher/Location
Haemophilus somnus immunogens & bovine GM-CSF: A new non-antibiotic approach to disease resistance in meat producing species	Little/U of G
Classifying undifferentiated bovine respiratory disease (UBRD), and identifying its important causes under field conditions	Martin/U of G
Development of rapid analytical methods to detect somatotrophin-treated animals	McBride/U of G
Pasture management systems for sheep production	McBride/U of G
Epidemiologic and economic study of drug usage and residue occurrence in Ontario market hogs	McEwen/U of G
Caseous lymphadenitis: prevalence in Ontario sheep and evaluation of an ELISA test to detect infection	Menzies/U of G
Chlamydia psittaci: seroprevalence in Ontario sheep & relationship to reproductive performance, neonatal survivability and management practices	Menzies/U of G
Influence of ureaplasma diversum on bovine embryonic development and mortality	Miller/U of G

Project Title	Researcher/Location
Development of criteria for accelerated beef processing & evaluation of methods of determining & describing beef product quality	Mittal,Barbut
Investigation of the immune response of sheep to chlamydia psittaci, the cause of enzootic ovine abortion	Shewen/U of G
Studies on bovine pasteurellosis: Part A: evaluation of immunity in young calves to the respiratory pathogen pasteurella haemolytica A1	Shewen/U of G
The use of chemotherapeutics in the Ontario rainbow trout industry: present & future concerns	Thorburn/U of G
A DNA probe for diagnosis of bovine viral diarrhea by in situ hybridization	Thorsen/U of G
Development & application of an improved serodiagnostic test for caprine-arthritis encephalitis (CAE)	Thorsen/U of G
Contaminants in livestock production: a review	Waltner-Toews/U of G
Evaluation for product quality in the Ontario bull test program	Wilton/U of G

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